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JOURNAL OF THE
INTERNATIONAL
GARDEN CLUB



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CONTENTS OF VOLUME I

NO. 1. AUGUST, 1917

Foreword	3
Introduction to Classification of Garden Tulips, by A. D. Hall, M.A.	5
Garden Design by Edward White	29
The History and Development of the Strawberry, by E. A. Bunyard, F.R.H.S.	69
Informal and Wild Gardening, by Norman Taylor	91
Lawns and Their Upkeep, by James MacDonald, F.R.H.S.	105
The Brooklyn Botanic Garden, by C. Stuart Gager, Director	119
Some Good Books for an Amateur Gardener's Library, by E. A. Bowles, M.A.	133
Spring Flower Show at Grand Central Palace, New York City, in 1916.	151
The June Flower Show at Bartow in 1916.	159
Roses and the Rose Garden at Bartow	
1. An Amateur's Rose Garden at the Beginning of the Twentieth Century, by Rev. J. H. Pemberton, N.R.S.	175
2. La Roseraie de l'Hay, by Jules Graveraux	177
3. The Rose Garden at Bartow, by W. Adams Delano	189
4. Autumn Flowering Pillar Roses, by H. R. Darlington, N.R.S.	193
5. The Lasting Qualities of Cut Roses, by G. L. Paul	211
6. New Species of Rosa, by W. Dallimore	213
7. Rugosa Roses, by H. R. Darlington, N.R.S.	219
8. Municipal Rose Gardens, by W. Easlea	237
9. The Progress and Development of the Rose during One Hun- dred Years of Peace, by H. R. Darlington, N.R.S., and Rev. J. H. Pemberton, N.R.S.	243
The Establishment of the International Garden Club: A Review by the President	257
Philippe de Vilmorin	275
Horticultural Notes	279

NO. 2. DECEMBER, 1917

Editorial Note.....	291
May-flowering Tulips and How They May Be Planted, by John Scheepers.....	293
Recent Investigations on the Production of Plant Food in the Soil, by E. D. Russell.....	317
A Garden of Ten Centuries, by F. A. Arnold.....	349
Arnold Arboretum Notes, by C. S. Sargent.....	361
A Guide to the Literature of Pomology, by E. A. Bunyard.....	381
The Foxtail Lily, by T. A. Havemeyer.....	431
Aquatic Gardening, by George H. Pring.....	435
Tree Surgery, by Alexander Lurie.....	457
The Best of the New Introductions for Outdoor Rose-growing, by George C. Thomas, Jr.....	473
Rose Breeding, by E. A. White.....	479
Possibilities in the Production of American Garden Roses, by Walter Van Fleet.....	485
"Plant Immigrants".....	497
Sieur de Monts National Monument and the Wild Garden of Acadia, by George B. Dorr.....	507
Plants from China.....	525
Report of the Tuxedo Horticultural Society.....	535
Flower Show at Grand Central Place in Spring of 1917.....	537
Book Reviews.....	543
Report from Library of the Club.....	557
Report from Garden Committee of the Club.....	563
Notes and News.....	571

Journal of the

INTERNATIONAL GARDEN CLUB

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CONTENTS

Foreword	3
Introduction to Classification of Garden Tulips, by A. D. Hall, M.A. .	5
Garden Design, by Edward White.....	29
The History and Development of the Strawberry, by E. A. Bunyard, F.R.H.S.	69
Informal and Wild Gardening, by Norman Taylor.....	91
Lawns and Their Upkeep, by James MacDonald, F.R.H.S.....	105
The Brooklyn Botanic Garden, by C. Stuart Gager, Director	119
Some Good Books for an Amateur Gardener's Library, by E. A. Bowles, M.A.	133
Spring Flower Show at Grand Central Palace, New York City, in 1916.	151
The June Flower Show at Bartow in 1916	159
Roses and the Rose Garden at Bartow	
1. An Amateur's Rose Garden at the Beginning of the Twentieth Century, by Rev. J. H. Pemberton, N.R.S.....	175
2. La Roseraie de l'Hay, by Jules Graveraux.....	177
3. The Rose Garden at Bartow, by W. Adams Delano.....	189
4. Autumn Flowering Pillar Roses, by H. R. Darlington, N.R.S.	193
5. The Lasting Qualities of Cut Roses, by G. L. Paul.....	211
6. New Species of Rosa, by W. Dallimore.....	213
7. Rugosa Roses, by H. R. Darlington, N.R.S.....	219
8. Municipal Rose Gardens, by W. Easlea.....	237
9. The Progress and Development of the Rose during One Hun- dred Years of Peace, by H. R. Darlington, N.R.S., and Rev. J. H. Pemberton, N.R.S.....	243
The Establishment of the International Garden Club: A Review by the President.....	257
Philippe de Vilmorin.....	275
Horticultural Notes.....	279

Journal of the

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No. I

Foreword



HIS first number of the JOURNAL meets a two-fold obligation. To our members it is the inauguration of an enterprise long delayed and anxiously waited for. To others it is offered as a contribution of the International Garden Club to the advancement of the art of gardening in America. Its pages will be open to all who have something to say that promises to make the art of gardening better for its having been said.

The JOURNAL will aim to reflect gardening as it is practised in America. But it also hopes to foster methods, long practised abroad, which, properly adapted to our climate, would work a singularly welcome change in our American landscape.

THE EDITOR.

Introduction to Classification of Garden Tulips*

By A. D. Hall, M.A.



THE garden Tulip began to be cultivated in Western Europe towards the middle of the sixteenth century. It came to us from the Turks, with whom it had already been for a long time in cultivation. It is supposed to have originated near Bagdad, and Turkish manuscripts of the fourteenth century are known in which many varieties possessing the special characteristics of the modern flower are enumerated. When the Tulip reached Europe it was already made a garden flower, presumably of composite origin, but the sources are quite lost, and none of the species which have latterly been discovered in the East can be fixed upon as the probable parents of the garden flower. A composite origin seems to be indicated not only by the great range of variation, but by the differences in the time of flowering which tend to segregate garden Tulips into two main groups flowering with us at intervals of nearly a month, by the presence or absence of yellow pigment, and by the occasional occurrence of flowers possessing a strong scent like that of *T. sylvestris*. A genetic classification of the garden Tulips thus becomes impossible with our ignorance of origins, and the only other scientific basis remaining would be one founded upon colour. Four sources of colour may be traced. Firstly, in nearly all Tulips the ovary is surrounded by a central blotch, formed by the lower portions of each petal and approximating to a circle in

* From the report of the Tulip Nomenclature Committee, Royal Horticultural Society. For this and the following "Scheme for the Classification of Garden Tulips" we are indebted to the Secretary of the Royal Horticultural Society, London.

shape, of a different colour from the rest of the flower. This *base* is deep blue or black in many forms, but it varies enormously in intensity, and may be entirely absent, so as to leave a circle of pure white or yellow. Only in a few of the true white or yellow selfs is the base indistinguishable from the rest of the petal. The shape and extent of the base may also vary considerably, though it is always symmetrical. In speaking of the colour of the Tulip the base is not taken into account. Secondly, the Tulip possesses a sap pigment, located in the cells of the mesophyll only. This pigment may be white or yellow, and it is, except for the basal colour, the only one present in the true white or yellow selfs. Thirdly, there is present in the epidermis of many Tulips an anthocyanin pigment, which varies through all shades of rose, red, and purple. That this anthocyanin pigment is confined to the epidermis may be easily ascertained by stripping the skin from the upper and lower surfaces of any garden Tulip other than the self yellows or whites, when the colouring will be found to have come off with the skin. This anthocyanin pigment tends to become a little more intense and to change a little in the direction of purple as the individual bloom ages. If it is superimposed upon white mesophyll it becomes the typical colour of that Tulip; superimposed upon a yellow ground it forms the true scarlets, oranges, and light and dark browns, which characterize the Tulips called "Bizarres." Lastly, there is in some Tulips a second yellow pigment related, however, to the anthocyanins and present in the epidermis alongside of the normal red or purple. This gives the flower a flushed or "shot" effect often very beautiful. This latter yellow pigment bleaches rapidly, and may even disappear as the bloom ages.

One other colour property of the Tulip, a very special one, must be dealt with here: that is, the process known as "breaking." When a Tulip seedling first blooms, if it contains any anthocyanin pigments, i.e., red or purple, that colour will be uniformly diffused all over the surface of the segments, and the result is a self-coloured flower (save for the base) known as a "breeder." This bulb and those which arise from offsets in

succeeding years remain similarly breeders, but sooner or later some, and doubtless eventually all, will undergo a remarkable change, known as "breaking." In the broken flower the anthocyanin pigment is no longer diffused all over the surface, but is segregated into stripes up the middle of each segment or fine featherings upon its edges. Often the shade changes somewhat on breaking; as a rule it becomes more intense. The offsets from a bulb that has thrown a broken flower will always be broken. As far as is known, reversion to the breeder state never takes place; though the markings of broken colour, which vary considerably in shape and distribution from year to year, may with age almost overspread the whole segment, still these heavy broken flowers are always to be distinguished from the true breeders. Breaking is accompanied by other changes in the plant. The leaves generally show a distinct mottling in the green; the stem possesses markings of anthocyanin pigment; the size, height, and vigour of the plant are reduced, and it does not throw offsets so freely. The cause of breaking remains unknown; change of soil, a hot and dry situation accelerate it, but we are acquainted with no method of preventing it. It is a property of all garden Tulips containing the anthocyanin pigment, i.e., of all except the white and yellow selfs.

This property of breaking adds greatly to the difficulty of classifying Tulips for garden purposes; the breeder and the broken or rectified flowers arising from it are so distinct that their common origin, indeed identity, would not be suspected, and they subserve quite different purposes in the garden. Hence a scientific classification based upon colour beomes as impossible as one based upon origin, and the Committee has fallen back upon a purely empirical classification based upon garden convenience alone. This aims at bringing into the same class flowers which "match" and possess similar habits, such as time of flowering, style of growth, colour, and shape. As a rule, flowers in the same class will be more nearly related than flowers in different classes, though varieties of common origin may have to go into different classes, and some varieties have to be placed rather arbitrarily on one side or other of the dividing line.

The classification begins by dividing the garden Tulips into early and late flowering, in practice a good division, though one or two intermediate varieties, like "*Le Rêve*," exist, and others may be expected. Certain races like the "*Van Thols*" may be distinguished among the earlies; some of them break, and quite a number of double forms exist.

Turning to the late or May-flowering Tulips, the main groups that have been adopted are Breeders, Broken, and Cottage Tulips, with minor groups for the Doubles and the Parrot Tulips.

The Breeders or self-coloured Tulips have already been defined. Though they all originate from a common stock and have much in common, they are subdivided into three sections, Dutch, English, and Darwins.

The Dutch represent the old parent stock; they show all shades of rose and purple (called "*Bybloemen*") which have white grounds, and again all shades of scarlet and brown, the "*Bizarres*," which possess a yellow ground. The bases may be of any shade of blue down to pure white; the form, sometimes a true cup, is generally egg-shaped when not fully expanded, with somewhat long and even pointed petals.

The English Tulips were segregated from the original Dutch stock during the early years of the nineteenth century by the labours of the English florists who insisted and refined upon certain points of excellence that had already been recognized by the Dutch florists. The segments must be broad and rounded and open to a true cup, approximately a hemisphere; the colours are generally clearer and brighter than those of the Dutch breeders, and the base must always be clean white or yellow without any trace of blue. They are subdivided into "*Roses*" (all shades of pink and rose), "*Bybloemen*" (purple and violet), both of which possess white grounds and bases, and "*Bizarres*" (various shades of scarlet and brown) with yellow grounds and bases. The other distinctive properties of the English Tulip are seen only in the broken state.

Somewhere, it is believed in Flanders, another race was segregated from the original Dutch stock and was introduced

into commerce in 1899 by Krelage under the name of "Darwin Tulips." They possess a stronger constitution than the original stock, grow taller, and have larger flowers of great substance. The shape is also characteristic; the flower segments spring at right angles from the stem and turn again at right angles to form the cup, so that the whole flower possesses a distinctive, squarely-built profile. Among the Darwins the yellow ground has been eliminated, so that only shades of rose and purple are recognized. The base may be any shade of blue down to pure white.

To the three classes of breeders, Dutch, English, and Darwins, correspond three classes of broken Tulips, for all members of this great group possess the property of breaking. The Dutch broken Tulips usually show considerable irregularity of marking, with streaks and splashes of rose or purple upon a white ground (Bybloemen) or of scarlet and brown upon a yellow ground (Bizarres).

The English florists insist upon complete distinctness and regularity of marking in the English broken Tulips; they distinguish two types: the "feathered" flowers, in which the marking is confined to a fine pencilling upon the edges of the petals, and "flamed" flowers, which possess a branching beam of colour up the centre of the petal in addition to the feathering upon the edges. Unfortunately, as yet, only a few varieties mark truly from year to year.

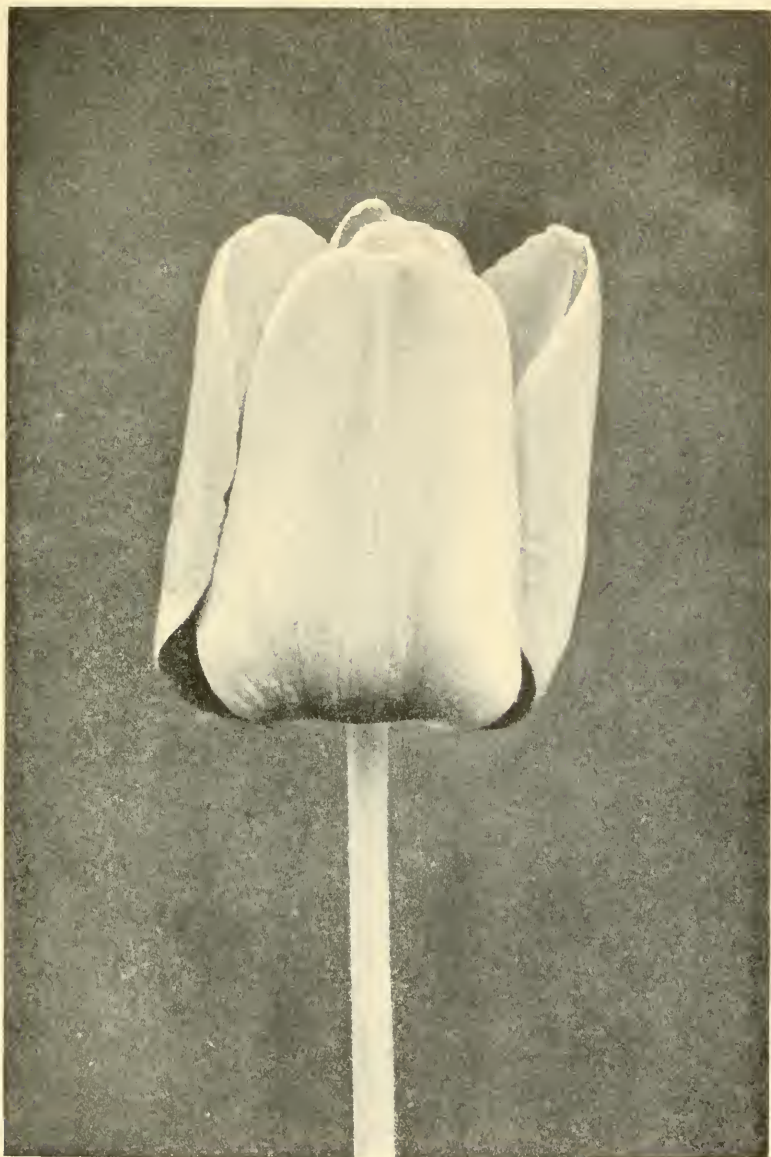
The broken Darwins, known as "Rembrandt Tulips," are even more irregularly marked than the Dutch; they generally show two shades of colour upon a white ground—splashes of the lighter breeder colour with irregular streaks of a darker shade.

The Cottage class is nothing more than a convenient gathering ground for a number of Tulips from the same general stock which could not be placed in the florist's classes, but which were sufficiently attractive to be kept for garden decoration. It includes the true selfs, white and yellow, which possess no anthocyanin pigment and never break. It also includes races which open with a narrow edge of red upon a white or yellow ground,

but as the flower ages the red extends until it flushes over the whole bloom. Among the other sections in the Cottage Tulips is one including various shades of red and crimson, and another including the shades of scarlet, orange, or brown. It should be remembered that all flowers of rose-red, crimson, and purplish shades possess a white ground colour, whereas the true scarlets and all brown shades are due to the same red or purple colours superimposed upon a yellow ground. Lastly we have a group of varying and indeterminate colours, in which the red or purple pigment is "shot" with a yellow shade of varying intensity. Again, there are broken classes for all the Cottage Tulips except the true selfs. Form varies greatly among the Cottage Tulips, and we may distinguish four types: (1) the true cup, as in "Bouton d'Or;" (2) the long pointed form, often showing a distinct waist, as in "Mrs. Moon;" (3) the form with pointed reflexing segments, giving the flower an outline resembling the heraldic fleur-de-lys, as in *retroflexa*; (4) the form that is in outline much like a long egg, as in "John Ruskin."

The Double Late Tulips need no definition. The Parrots include a few varieties with cut and lacinated petals, often showing blotches of green unpigmented tissue. The Parrots are usually marked with scarlet or brown upon a yellow ground, but a few are known with white grounds. As a rule they have weak stems and do not bloom very freely. As a final group we have to bring together all the true species, not that they possess necessarily anything in common, save the property of breeding true, but simply for convenience. It should be noted that many of the so-called species, which have Latin names in the catalogues, are really garden forms, and are mostly included in the Cottage section. Among such varieties are *Gesneriana*, *vitellina*, *fulgens*, *retroflexa*, etc.

Synonyms abound among garden Tulips. Sometimes this has been due to accidental or deliberate re-naming; sometimes a broken form has been given a name different from that of the breeder form. The Committee has endeavoured to preserve the best-known name and record all the synonyms, and in the case of broken flowers to indicate the breeders from which they sprang.



DARWIN TULIP
"BLEU AIMABLE"

6



DARWIN TULIP
"CLARA BUTT"

*Scheme for the Classification of Garden Tulips; With List of
Selected Varieties*

SECTION I.—EARLY FLOWERING.

Definition: Of garden origin, dwarf habit, and in full flower before the end of April.

SUBSECTION A.—DUC VAN THOL TULIPS.

Definition: Very early Tulips, rarely exceeding six inches in height. [Suitable for pot cultivation only.]

SUBSECTION B.—SINGLES.

a. White.

For Pots: Pottebakker White, Lady Boreel, Princesse Hélène.

For Bedding: Washington, Lady Boreel, Princess Marianne, Pottebakker White, White Swan (late), Jacoba van Beyeren.

b. White and yellow.

For all purposes: Brunhilde, Princess Ida.

c. White, flushed pink.

For Pots: Rose of Holland, Queen of the Netherlands, La Reine.

For Bedding: Rose of Holland, La Reine.

d. Pink on white.

For Pots: Rose Gris-de-lin, Rose Tendre.

For Bedding: Rosamundi Huyckman, Alice Roosevelt, Rose Gris-de-lin.

e. Deep rose and white.

For Pots: Rose Luisante, Le Matelas, De Vlieger.

For Bedding: Pink Beauty, Cottage Maid, Wapen van Leiden, Princess Wilhelmina, De Vlieger.

f. Deep rose.

For Pots: Jenny, Stanley, Van Berghhem.

For Bedding: Jenny, Stanley, Cramoisi Royal.

g. Cerise.

For Pots: Aelbert Cuyp, Joost van den Vondel,
Paul Moreelse.

For Bedding: Joost van den Vondel, Couleur
Ponceau, Mrs. Langtry, Aelbert Cuyp.

h. Crimson.

For Bedding: Bacchus.

i. Scarlet.

For Pots: Vermillon Brillant, La Grandeur,
Orange Brilliant, Cramoisi Brillant.

For Bedding: Vermillon Brillant, Dusart, Sir
Thomas Lipton, Artus, Couleur Cardinal.

j. Orange-scarlet.

For Pots: Prince of Austria.

For Bedding: Prince of Austria, Grace Darling.

k. Orange.

For all purposes: Fred. Moore, Thomas Moore.

l. Orange and yellow.

For Pots: De Wet, Cardinal Rampolla.

For Bedding: De Wet, Cottage Boy, Cardinal
Rampolla, Golden Lion.

m. Yellow.

For Pots: Yellow Queen, Mon Trésor, Prince de
Ligny.

For Bedding: Yellow Globe, King of the Yellows,
Goldfinch, Prince de Ligny, Golden Queen,
Royal Sovereign.

n. Primrose.

For Pots and Bedding: Primrose Queen.

o. Purple.

For Pots: Van der Neer, President Lincoln, Mo-
lière.

For Bedding: Van der Neer, Wouwerman, Presi-
dent Lincoln, Molière.

p. Red and yellow.

For Pots: Hector, Keizerskroon.

For Bedding: Duchesse de Parme, Hector, Kei-
zerskroon.



ENGLISH TULIP
"SIR JOSEPH PAXTON"

- q. Purple edged white.
For Pots: Mrs. Elwes.
For Bedding: Lac Premier, Eleonora, Lac van Rhijn.
- r. Striped, white ground.
For Pots: Fabiola, Spaendonck, Admiral Reyniers.
- s. Striped, yellow ground.
For Bedding: Golden Bride of Haarlem, Duc d'Autriche.
- t. Of other colours.
For Bedding: Enchantress, La Remarquable, Potter.
- u. Foliage striped.
For Pots: Rose Luisante, Joost Van der Vondel, Silver Standard.
For Bedding: Yellow Prince, Rose Aplatie.

SUBSECTION C.—DOUBLES.

- a. White.
For Pots: Schoonoord, White Salvator Rosa.
For Bedding: Schoonoord, Boule de Neige, Alba Maxima, La Candeur.
- b. White, flushed pink.
For Pots: Murillo, Raphael.
For Bedding: Raphael, Parmesiano.
- c. Rose.
For Pots: Lady Palmerston, Couronne des Roses, Salvator Rosa.
For Bedding: Virginia, Lady Palmerston, Couronne des Roses.
- d. Deep Rose.
For Bedding: Lord Beaconsfield, La Victoire.
- e. Cerise.
For Bedding: Queen Emma, Arabella, Rozenkroon.

- f. Scarlet.
For Pots: Vuurbaak, Imperator Rubrorum.
For Bedding: Vuurbaak, Imperator Rubrorum,
Rubra Maxima, Willem III.
- g. Orange and red.
For Pots: El Toreador, Prince of Orange.
For Bedding: El Toreador.
- h. Red, edged yellow.
For Pots: Tournesol.
For Bedding: Pieneman, Titian, Gloria Solis.
- i. Yellow and orange.
For Pots and Bedding: Couronne d'Or, Yellow
Tournesol.
- j. Yellow.
For Pots: Mr. van Tubergen.
For Bedding: Mr. van Tubergen, Velasquez.
- k. Primrose.
For Pots and Bedding: Safrano.
- l. Puce.
For Pots and Bedding: Lac van Haarlem, Tur-
ban Violet.
- m. Of other colours.
For Pots: Harlequin.
- n. Foliage striped.
For Pots: Tournesol.

SECTION II.—MAY-FLOWERING.

Definition: Of garden origin, mostly of tall and robust habit, and usually flowering after May 1.

SUBSECTION A.—COTTAGE VARIETIES.

Definition: All Tulips which do not fall within the other classes. The colours may be pure white or yellow, all shades of pink, crimson to purple, orange, and brown, and various "shot" shades, produced by the combination of pink or purple colours on a yellow ground. The shape may be (a) a true cup

with rounded segments, (b) a long flower with pointed segments, (c) a long flower with reflexed segments, (d) long egg-shaped.

a. White.

Parisian White, Dora.

b. White, edged pink.

Elegans alba, Picotee, Carnation.

c. Cream, flushed pink.

Isabella, Innovation, Pride of Inglescombe.

d. Pink.

Inglescombe Pink, Mrs. Kerrell, Sir Harry.

e. Cerise.

Cassandra, Rosalind, Rose Beauty.

f. Cochineal red.

Gesneriana spathulata, Fulgens, Glare of the Garden.

g. Scarlet

Scarlet Emperor, Inglescombe Scarlet, Beau Brummell.

h. Orange-scarlet.

Orange King, Grenadier, Boadicea, La Merveille.

i. Yellow.

Inglescombe, Yellow, Mrs. Moon, Bouton d'Or, Avis Kennicott.

j. Primrose.

Ellen Willmott, Moonlight.

k. Yellow, edged red.

Cardinal Billiet, Illuminator, Golden Crown.

l. Light bronze.

Jaune d'Oeuf, Garibaldi, Yellow Perfection.

m. Dark bronze.

Golden Bronze, Goudvink, Quaintness.

n. Shot.

John Ruskin, Beauty of Bath, The Fawn, Fairy Queen.



COTTAGE TULIP
"BOUTON D'OR"



COTTAGE TULIP
"MRS. MOON"

SUBSECTION B.—BREEDERS.

Definition: Self-coloured flowers, except as regards the base.

(1) Dutch Breeders.

Definition: Flower oval or cupped, brown, purple, or red, but sometimes bronze; base white or yellow, but generally stained blue or green to blue-black.

a. Roses.

Definition: Pink to red.

May Queen, Charles Dickens.

b. Bybloemen.

Definition: Purple to violet.

Bacchus, Cardinal Manning, Godet Parfait, Velvet King.

c. Bizarres.

Definitions: Shades of scarlet, bronze or brown.

Dom Pedro, Louis Quatorze, Panorama, Prince of Orange.

(2) English Breeders.

Definition: Flower forming $\frac{1}{3}$ to $\frac{1}{2}$ of a hollow ball when fully expanded; base always white or yellow, without trace of other colour.

a. Roses.

Definition: Rose shades, with white base.

Annie McGregor, Mabel, Mrs. Barlow, Rose Hill.

b. Bybloemen.

Definition: Purple shades, with white base.

Adonis, Elizabeth Pegg, Talisman.

c. Bizarres.

Definition: Brown shades, with yellow base.

Sir Joseph Paxton, Samuel Barlow, Sulphur, Goldfinder.

(3) Darwins.

Definition: Lower portion of flower usually rectangular in outline; segments of good substance; stems strong and tall; colour, shades of purple, red to white, never yellow or brown; base black, blue, or white, or any combination of these colours.

a. Scarlet-vermilion.

Isis, Feu Brilliant, Whistler, City of Haarlem.

b. Cochineal red.

Farncombe Sanders, Van Poortliet, Prof. Rauwenhof, Europe.

c. Cerise.

Pride of Haarlem, Prince of the Netherlands, Mattia.

d. Magenta.

William Goldring, Admiral Togo, The International.

e. Light Magenta.

Centenaire, Nauticus, Adèle Sandrock.

f. Rose.

Edmée, Princess Elizabeth, Baronne de la Tonnaye, Venus.

g. Pale Rose.

Psyche, Suzon, Flamingo, Sophrosyne.

h. Salmon-Pink.

Clara Butt, Yolande, Maiden's Biush.

i. Crimson-Maroon.

Marcella, Henner, King Harold, Millet.

j. Maroon-Black.

Fra Angelico, Philippe de Comines, Zanzibar.

k. Purple-Black.

Faust, Zulu, La Tulipe Noire.

l. Purple.

Frans Hals, Marconi, Paul Boudry, Raphael.



COTTAGE TULIP
"RETROFLEXA"



COTTAGE TULIP
"JOHN RUSKIN"

- m.* Violet-Purple.
Valentin, Moralis, The Bishop, Viking.
- n.* Rosy Purple.
Palissa, Violet Queen, Mrs. Potter Palmer.
- o.* Rosy Lilac.
Euterpe, Ascanio, Pygmalion.
- p.* Lilac.
Erguste, Bleu Aimable, Melicette, Rev. H. Ewbank.
- q.* Lilac, with a lighter edge.
Mauve Clair, Electra, Wally Moes, Nora Ware.
- r.* Blush.
L'Ingénue, Margaret, Zephyr.
- s.* Slaty Lilac.
Oliphant, Remembrance, Ronald Gunn.

SUBSECTION C.—BROKEN TULIPS.

Definition: Flowers in which the colour appears in the form of stripes on a lighter ground colour, generally white or yellow.

(1) Broken Dutch.

a. Roses.

Definition: Rose or cerise markings on white ground.

Admiral Kingsbergen, Comte de Vergennes, Henry VIII, Perle Brillante.

b. Bybloemen.

Definition: Violet or purple markings on white ground.

Dainty Maid, Impératrice de Maroc, May Blossom.

c. Bizarres.

Definition: Brown, red, or purple markings on yellow ground.

Cherbourg, Miss Doris Diggle, Trafalgar.

- (2) Broken English.
 - a. Roses.
Definition: Rose markings on white ground.
Annie McGregor, Mabel, Aglaia, Rose Hill.
 - b. Bybloemen.
Definition: Purple markings on white ground.
Talisman, Adonis, Duchess of Sutherland.
 - c. Bizarres.
Definition: Brown or black markings on yellow ground.
Samuel Barlow, Sir Joseph Paxton, Dr Hardy, George Hayward, Lord Stanley.
- (3) Rembrandts.
Definition: Broken Darwins.
 - a. Roses.
Definition: Rose markings on white ground.
Red Prince, Semele, Victor Hugo.
 - b. Bybloemen.
Definition: Purple markings on white ground.
Françoise d'Amboise, Procles.
- (4) Broken Cottage.
 - a. Roses.
Definition: Rose markings on white ground.
Striped Beauty, Zomerschoon.
 - b. Bybloemen.
Definition: Purple markings on white ground
Twilight, Union Jack.
 - c. Bizarres.
Definition: Brown, red, or purple markings on yellow ground.
Chameleon, Gala Beauty, Scotia.

SUBSECTION D.—PARROTS.

- Definition:* Tulips with laciniate segments.
Amiral de Constantinople, Lutea major,
Markgrafen Baden, Crimson Beauty.

SUBSECTION E.—DOUBLES.

Blue Flag, Mariage de ma Fille, Yellow Rose,
Rose Pompon.

SECTION III.—SPECIES.

Definition: Tulips which are or have been found wild,
and which keep their characteristics under cultivation.

e.g., *Clusiana*, *Greigii*, *Fosteriana*, *sylvestris*,
Batalini.

*Garden Design**

By Edward White



HE subject of garden design is concerned with so much detail, and involves opinions on so many matters affected by taste, that to-day we cannot do more than refer to a small proportion of the questions at issue.

During recent years there has been a marked development in the planning of gardens, particularly of those of moderate extent. The large number of new residences with pleasure-grounds surrounding them have offered wide opportunities for experiment, and there has been a corresponding interest in the question of appropriate design. Indeed, it would be difficult to name any other artistic or intellectual recreation which has taken a greater hold upon the community in general. We have consequently become so familiar with the idea of beautiful gardens in this country that we are apt to take them as a matter of course. To appreciate the special advantages we enjoy one has only to travel in some of those countries in which the art of gardening is little developed. The sensation of journeying through hundreds of miles of inhabited country without seeing a single private garden in which there is any sign of ornamentation as an Englishman understands it, fills one with a feeling of pity for the people to whom the pleasure of gardening is apparently a closed book. In the United Kingdom the garden is a matter of the utmost importance in the scheme of an ideal country establishment. Such an establishment is a self-contained entity, usually the outcome of many

* Adapted from a paper read November 4 and December 2, 1913, before the Royal Horticultural Society, London, and illustrated with the accompanying photographs of American gardens. Reprinted through the courtesy of the Secretary of the Royal Horticultural Society.

years of affectionate attention from successive owners. The erections which cluster around the mansion, which is the heart of the scheme, are conveniently disposed, and the amenities include the gardens immediately about the house, a sheltered kitchen garden, glass-houses, an orchard, and other gardens which usually merge into the park lands. The mansion is dignified and conveys a sense of hospitality and comfort. We picture it as being framed by massive old trees which offer a guarantee of age, and create at the same time a feeling of unity by melting into more wooded scenery beyond. A placid sheet of water frequently adds peace to the picture, and the harmony is intensified by the extended pleasure-grounds and verdant lawns which serve as a link between the architectural lines of the terraces and the quiet restfulness of the landscape.

These are the characteristic features of a typical English country establishment, the possession of which is the ultimate desire of most Englishmen.

In establishments of smaller pretensions the scale of the garden should naturally vary with the proportions of the house, for the sense of harmony is spoilt when the garden is too ambitious or too mean for the residence. It would be difficult to set a limit in acres upon the size of any garden in relation to a given house, for a good deal depends upon the method of its arrangement and something upon the surroundings. Happily the charm of a garden does not depend upon its size, for the smallest one is capable of the most enchanting transformation when skill is brought to bear upon its plan. Nevertheless it should not be forgotten that it is from the large places that the best ideas generally emanate, as they are the scenes of unceasing experiments in horticulture and artistic arrangement.

In the larger gardens the absorption of landscape scenery in the principal views is customary and plays a considerable part in our conception of an ideal garden, which is animated largely by sympathy with home landscape. Consequently a strong feeling for what is called nature is incorporated with and expresses itself in all gardens. No English garden-maker can hope for popular recognition unless he is thoroughly imbued

with this sympathetic feeling and possesses the ability to give expression to it.

A love of nature is necessary for a complete understanding of the artistic side of gardening, and gardeners will always claim a foremost place among the declared lovers of nature, for their work continuously develops the power of finding attraction in effects to which others may be blind. Many of those subtle forms of nature, however, which possess allurements for the horticulturist may fail in the quality of beauty. Similarly the ability to practise horticulture, so necessary in the perfect garden, implies no special power to appreciate beauty, much less to create it. It is possible for a garden to contain every tree shrub, and flower perfect of its kind, but it will be a failure from an artistic point of view unless the trees and plants are arranged in picturesque proportions. To be a work of art as we understand it, the parts of a garden must be arranged deliberately to produce pictorial effect.

Whatever difference of opinion there may be about details—and the form or style of a garden is a detail—the ideal garden will present the largest possible number of perfect pictures, and to satisfy this ideal condition it is necessary that every salient point of view should introduce a real picture, in which all that comes within vision unites to perfect the scene. Consequently the craftsman who aspires to make a garden in which “the excellencies of nature” are harmoniously united must have a clear knowledge of what actually constitutes a picture before he can feel sure of his ability to produce one. He must not trust to chance, nor rely upon the friendly aid of nature to cover his deficiencies. The mere capacity to recognize beauty is not sufficient. He must acquire a knowledge of the technique of picture-making. There is no way of obtaining such knowledge except by applying one’s mind to the problems involved. It is the opinion of many that painted pictures are better subjects for such study than average garden scenes. One may be sure of the correct guidance of famous landscape painters, whereas perfectly composed garden pictures are extremely difficult to find. ^ Study of the methods of composition and colouring of

the best landscape artists will implant in one's mind many useful principles, of which instinctive use is made when engaged in the work of picture-making by actual garden practice. The following are a few of the lessons that may be acquired. One may learn something of the principles of connexion and how necessary it is to connect the different objects in a scene; how the parts in detail are treated to form a well-planned whole; how to hint at some concealed attraction without weakening the effect by premature disclosure; how buildings should be associated with and framed by the landscape. One may see how a real picture is divided into three points of distance, and appreciate the very great importance of showing clearly what is nearest; how necessary it is to give a definite meaning to every picture. One will learn the value of contrast; how to omit useless object and how to group features which otherwise might have a scanty effect; and with practice to learn generally how to avoid tameness on the one hand and over-elaboration on the other. In one of the simplest of Ruskin's works, *The Elements of Drawing*, are given useful definitions of such qualities as unity, harmony, and sympathy, and easy explanations of the laws of repetition, continuity, radiation, contrast, etc., which, although written for the use of artist-students, will be found none the less valuable in teaching the garden designer something of the art of composition and help him to separate the good from the bad in any picture presented in the garden or elsewhere.

Ruskin insists on the impossibility of laying down rules to ensure proper composition, and states that, although no one can invent by rule, there are simple laws of arrangement which it is well to understand, because, even if these cannot help one to produce a good picture, they may assist in one's work. In his definition of composition he says that "the first object is to secure unity," and the *best* mode of effecting this is to determine that one feature shall be more important than the rest, and that the others shall group with it in subordinate positions. This is a simple enough maxim, and one which could be applied with advantage to many present-day garden scenes. So

many views, especially in what are called landscape gardens, are unnecessarily vapid in character for want of some feature which stands out distinctively; others—generally in symmetrical gardens—by reason of a fault which amounts to the same weakness. They contain too many important features of equal value which neutralize the effect of each other. Such ineffective scenes may often at a single stroke be transformed into a picture by the application of the principle quoted. In dealing with the law of repetition, Ruskin remarks that “one of the pleasantest kinds of sympathy is when one group imitates or repeats another; not in the way of balance or symmetry, but like a broken echo of it.” The absence of this principle is the cause of the restlessness which disturbs so many garden scenes. “In landscape composition,” he says, “the principle of balance is more or less carried out in proportion to the wish of the artist to express disciplined calmness. In bad composition, as in bad architecture, it is formal—a tree on one side answering a tree on the other; but in good composition, as in graceful statues, it is always easy and sometimes hardly traceable.” It is advisable to note that this dictum refers to landscape only, and not to symmetrical gardens.

Space is found for these quotations to show that, from the teaching of Ruskin, very valuable principles of art may be acquired which can be applied to garden-design. Whether he knew little or much of garden craft, his artistic instinct would have enabled him to solve many problems in design which puzzle an expert landscape gardener.

We desire by no means to ignore the necessity for a sound knowledge of horticulture as part of the equipment of a garden-designer; but in order to conceive a series of beautiful garden scenes both imagination and artistic skill are pre-eminently necessary. The Japanese appreciate this point very strongly, and it is commonly understood that their most important garden works are composed as pictures by accomplished painters as a preliminary to handing the design to a gardener for execution.

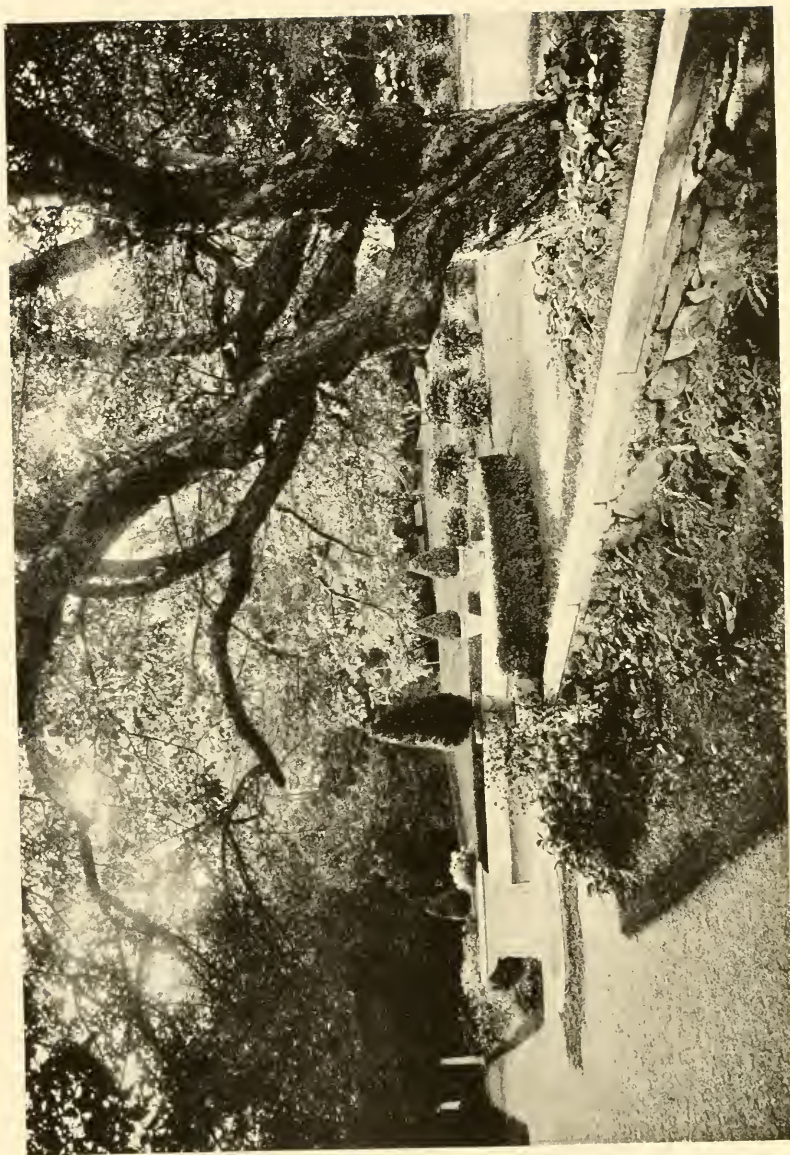
It cannot be denied that imagination directed from different

angles of thought and the expression of unbiased views on design have broadened the basis of the art and increased greatly its variety and interest. Landscape gardeners will do well to profit by the suggestions which come to them from divergent points of view. They should study the desire of the artist for a garden which satisfies the instinct for picturesque effect. They should recognize the anxiety of the architect for a sense of order and a feeling of unity between the house and the garden. They will naturally share the passion of the horticulturist for variety and an abundance of interesting and beautiful plants, and they may learn, moreover, to tolerate the restrictive common sense of the client whose privilege it is to provide the wherewithal, and will sympathize with his solicitude for the preservation of as many existing features as possible. The capable landscape gardener will skilfully combine and give a well-balanced value to each of these expressions of opinion, coming as they do from masters in their own department.

It is the ideal of an architect to adjust the plan of a house in such a way that no other structure could conceivably appear to be more appropriate to the situation. He desires to fit the materials and design to the purpose of the building and to make them harmonize with the site and surroundings. The landscape gardener professes similar ideals, and will associate himself with this striving after harmony. He also will try to plan his garden in such a way that no other treatment should be in truer sympathy with the house and more appropriate to the site. The house and garden must, therefore, be considered as indivisible parts of one composition, towards which the architect and landscape gardener should work hand in hand. They must understand each other's proposals and the effects aimed at. The influence of the house is dominant. It is the *raison d'être* of the garden and the heart of the whole scheme. It usually occupies the centre of the most striking picture, it overlooks the fairest scene, and should be displayed in its most favourable aspects. The important purpose of a garden is to provide a setting in sympathy with such a house, and the style of the building must influence all garden features of an archi-



WOODLAND PATH
STOCKBRIDGE
THE LATE JOSEPH H. CHIOATE, ESQ.



CHESTERWOOD, GLENDALE
DANIEL CHESTER FRENCH, ESQ.

tectural character. The unity of the composition will be emphasized by the extension of the axial lines of the house into the garden, either in the form of main walks or by central vistas, and by every other expedient which will grasp the best features of the situation. The landscape gardener will be the more loyal servant of his art if he remembers that the garden is made for the house, and not the house for the garden. The house will always be placed in a way to take the best possible advantage of distant views, but some discretion in this respect is necessary. An important effect should not be made to rely too completely upon a vista likely to be spoiled in the future by building or other operations, otherwise, when the necessity arises for planting out anything objectionable, the proportions of the garden picture will be disturbed. In the arrangement of a vista care should be taken that the dominance of the main view should not be weakened by the opening of side vistas on such a scale as to compete with, and distract the eye from, the principal line of sight. Some persons make a fetish of their objection to the sight of any building whatever in the view beyond the garden, even at a great distance. There are many fine prospects enjoyable enough for their repose and freedom, which would be all the better from an artist's point of view if they contained some distinctive object which would serve to focus the picture.

Many writers on gardens from the architect's standpoint object to what they describe as the confusion of the garden with the landscape, and insist on the desirability of very definite boundaries, even though such boundaries may necessitate the drawing of a hard cross-line in a fashion which no painter would tolerate in the centre of one of his pictures. The idea of assimilation has been ridiculed in an otherwise admirable article on gardens by an architect, the writer suggesting that it is as foolish to make your wall-paper blend with your pictures as to combine gardens with landscape. It would be well to leave the matter at that point if nothing more effective could be said against it. A landscape gardener soon learns the danger of dogmatizing, but it will surely be conceded that the principle

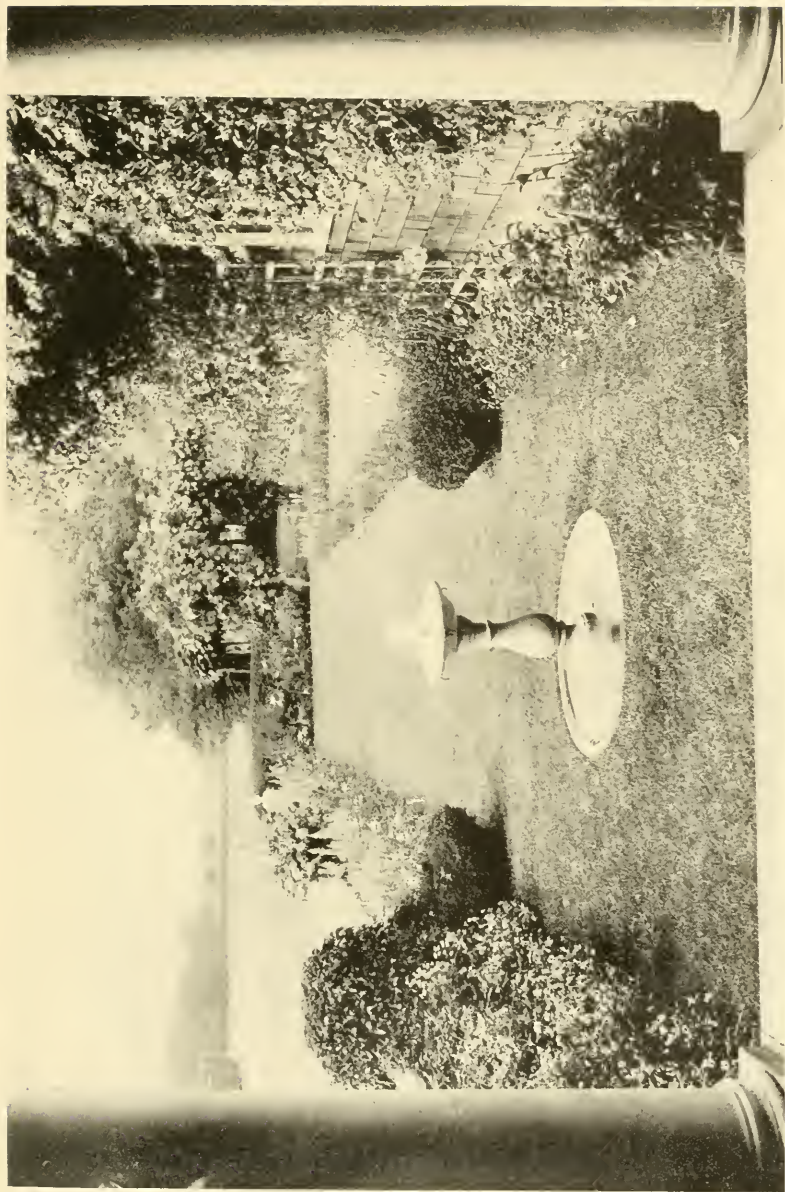
of gradation from the refinement of a made garden into the naturalism of surrounding woodland is one which offers a charm rarely given by the employment of a visible boundary wall, fence, or hedge, and my first endeavour would always be to make either form of boundary as inconspicuous as possible.

Naturally, however, a good deal depends on the form of the garden and on what lies beyond, so that every case must be considered on its merits.

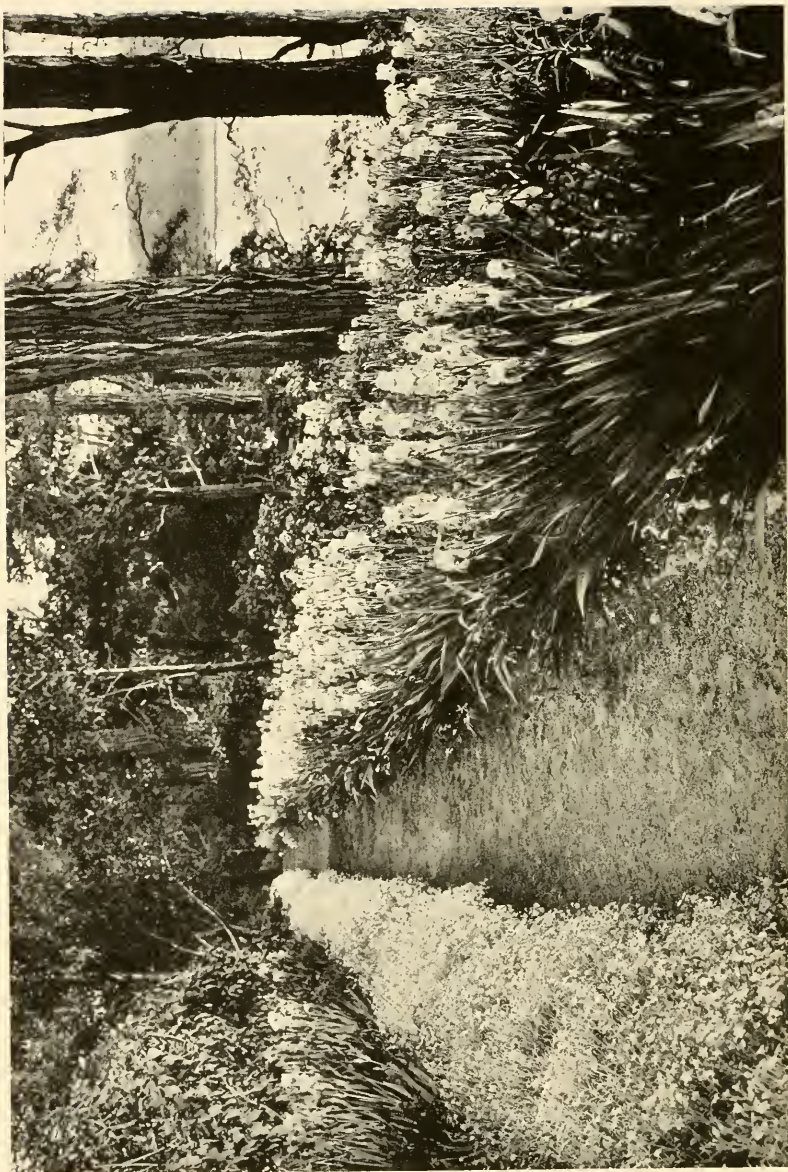
It is well known to how great an extent photography has increased interest in the pictorial effect of gardens. The utility of such pictures to landscape gardeners and garden owners is obvious. They offer some facilities, however, of doubtful benefit. For instance, it is not unusual for an amateur who intends to make a garden to collect all sorts of photographs of pleasing garden scenes, and to submit these to a designer with the idea of making them or their like the basis of a new garden. A garden designer of experience will know how to deal with such circumstances without offending his client or depressing his imagination by an attempt to make a puzzle of a series of scenes collected from alien sources. It should be remembered that such scenes generally owe much of their happy effect to their original surroundings, which cannot well be imitated, and this will explain why a borrowed design is rarely as effective in a new position as in the original one.

Moreover, the pleasing effect of many a garden photograph is due to some little technical touch which is entirely beyond the knowledge of anybody unversed in the wiles of an artistic photographer.

Sometimes exaggerated and none too clear language is employed concerning the development of what is called "the genius of a place." Undoubtedly most sites do possess, in addition to an inherent local character, some individuality which suggests a form of arrangement differing from that of any other garden, and it would be wise to develop these advantages before borrowing ideas elsewhere. Local characteristics are expressed by geological and climatic conditions to which witness is borne in the form of contours, the nature of soils, and the



A SOUTHAMPTON GARDEN
MRS. E. TIFFANY DYER



AN IRIS BORDER
ROSLYN
ADMIRAL WARD

flora natural to a district. A garden should harmonize with local conditions, but it must express personal individuality if it is to be interesting. The most striking quality it possesses should therefore be looked for and developed.

It is difficult to particularize, but such features may be found in some special view, in the peculiar undulation of the ground, in some striking group of trees, in a piece of water, or other scene. If no suitable nucleus exists, then a character must be invented for the garden.

This calls for a special effort of the imagination on the part of the garden designer, for imagination is the life-force of all art. The art of garden design would degenerate if its practice were reduced to a formula and to the automatic adoption of a limited number of set ideas. Gardening has suffered from decay on more than one occasion during its history owing to the paralysis of imagination, but there is no fear of such a set-back when every new garden possesses a real individuality. It is to be hoped, therefore, that garden owners will insist upon the exercise of imagination in the landscape gardeners they employ, and will refuse to be satisfied with the reproduction of features which have been successfully designed for other situations.

One must not, however, be too insistent about the development of the genius of any site before it is quite certain that the said genius is well disposed towards horticulture. Such is no more necessarily the case than that the benevolence of Nature towards the desires of the garden designer can always be taken for granted. Left to herself, Nature will ruin any garden, and sometimes she will only give her assistance under conditions entirely opposite to those she exercises locally. For instance, the ruling spirit in many exposed sites is a lusty wind, which must be checked in its force before success can be hoped for. This may necessitate a form of garden entirely opposed to local conditions and in defiance of the genius of the place.

It has been said that the vitality of garden art springs from the continual exercise it affords for the imagination. Many people, nevertheless, expect to find in a standard work on gar-

den design some written formula for the solution of every problem. Without decrying in any way the great value of existing garden literature, one can safely say that every garden which is to possess real character offers one problem at least which is peculiar to itself and must be solved on its own merits. Directly a master work is published which will teach everybody to make the most of every conceivable situation, the day of the landscape gardener will be over.

Imagination, however, will work more freely if all information that is available can be reduced to some serviceable order. One should therefore adopt systematic methods as far as possible and follow a logical sequence of ideas, either in the planning of a new garden or the re-modelling of an old one.

At the outset the temptation to make a place pretty should be postponed. Mere prettiness may always be applied to any well-conceived plan in a series of finishing touches. There are few places so badly planned that this is impossible.

Every problem should be solved ultimately on the basis of simple common sense.

Art has been defined as the acme of common sense, and, properly exercised, these respective aims will rarely come into conflict. Compromise will always play the principal part in the arrangement of every garden, even though it is necessary to adhere consistently to the principles to which most importance is attached. If side issues are permitted to gain precedence over original intentions, weakness and lack of individuality are a sure consequence. A garden that pretends to satisfy every critic is as little likely to succeed as an individual who attempts such an impossible task.

Before deciding upon the principles that are to be deemed decisive in any particular case, it is well to tabulate all the information available.

In the first place a plan is needed giving full information as to existing conditions on the site, and marking the position of all buildings erected or proposed, trees and other features, together with contours and levels.

If the house has already been built we shall assume that

the position has been fixed by a process of compromise between the various claims of aspect, elevation, distant views, local attractions, shelter, convenience of access, etc.

1. We shall require plans and elevations of the house. These will show the position of all doors and windows of the living-rooms commanding views of the garden, etc., as well as the domestic quarters.

2. We shall proceed to mark on the plan the lines of view offering the most extensive and picturesque vistas.

3. We shall take note of the existing features worth preservation, or which may offer a nucleus for further development, and shall look particularly for those characteristics likely to suggest some keynote of individuality.

4. We shall observe those positions exposed to the wind and the situation of undesirable objects either on the site or beyond the boundary which must obviously be screened, as well as those of any outlying features which may some day be worth incorporating in an extension of the grounds.

5. Observations will be made of the sunniest, the shadiest, and the least inviting spots, of the general lie of the ground, of the necessity for drainage, of the nature of soil and sub-soil, of the kinds of trees and shrubs which flourish locally, and other matters of similar nature.

6. We shall consult our client in order to discover any special preferences as to the style of the garden, and settle upon such detailed features as are desired to be introduced, such as the number of tennis or croquet grounds, rose, rock, water gardens, herbaceous border, garden houses, etc., and we shall note any special likes or dislikes with regard to plants and flowers.

The suitability of any particular spot upon the site for the features determined upon will be considered.

7. The dimensions required for the kitchen garden and the location of the glass-houses will require attention.

Inquiry will have to be made as to the time of year, if any, during which the owner is likely to be absent from the house, and the season at which the garden is required to be at its best.

Consideration will be given to the number of gardeners likely

to be permanently employed in the upkeep of the gardens. This point does not always receive sufficient attention, although it is necessary not to make a garden too large for the staff to maintain.

In cases where there is to be a limit of expenditure on the gardens, the maximum cost will be a spectral figure constantly in view.

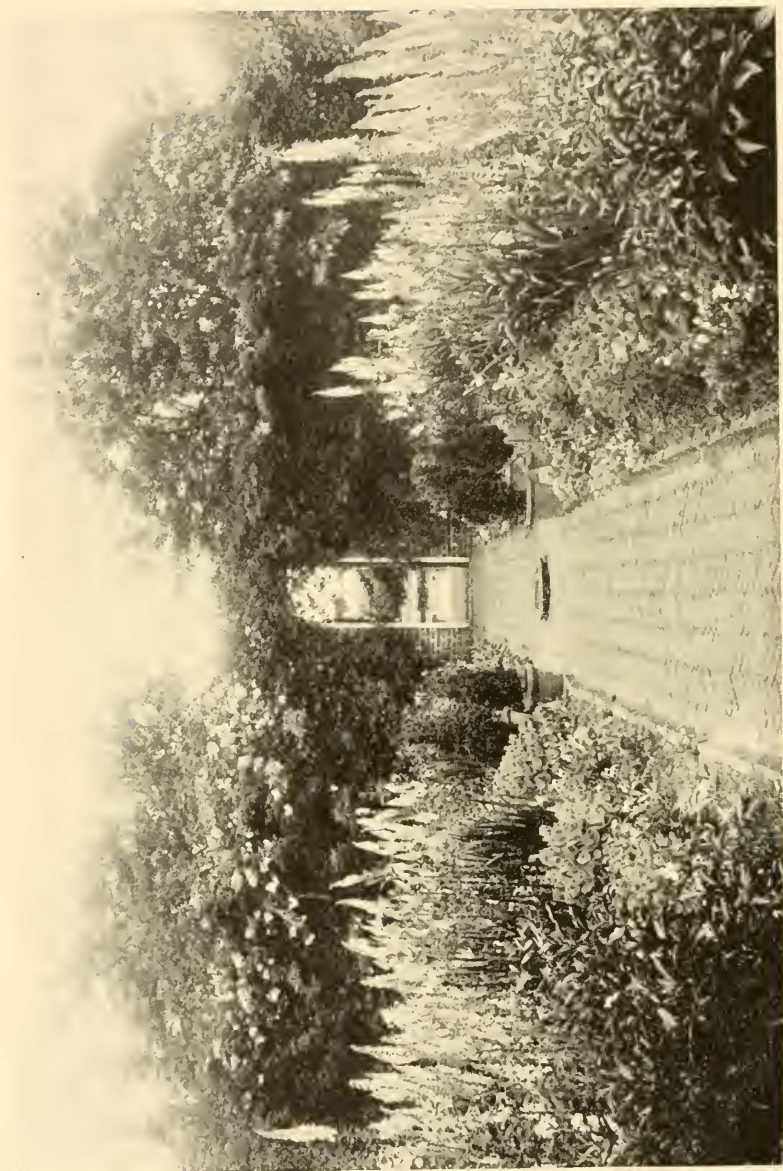
The considerations governing the selection of the site for a house need not concern us at present. The importance of the matter in relation to the garden is fairly obvious, and it becomes doubly evident when one commences to arrange the line of the carriage drive. The latter question is one which cannot be considered too carefully, as it generally influences the arrangement of the entire garden. Unfortunately it is too often settled as a separate detail, as if it were of no real importance to the garden design. In such cases it has generally been constructed by the architect and handed over to the landscape gardener as an accomplished fact. This may be due to the anxiety of the former that his house shall be approached in such a manner as to give the best possible architectural effect. It is a very natural desire, but when the thoughts of the architect are centered upon the house, as they generally are, the opportunities for making the most of the intermediate ground may be neglected.

The expert garden designer will enter fully into the desire of the architect and will not forget that the house is the intended destination of the carriage drive. He will therefore take his inspiration from the building, and by appropriate treatment will try to prepare the mind of the visitor for the pretensions of the house.

Too often a carriage drive is treated as a piece of roadway of which the sole purpose is to connect the front door of the house with the main road. Dense shrubberies shut it in on both sides, through which the eyes of the visitor are unable to penetrate. This is often an unnecessary measure for the preservation of privacy, and many fine opportunities for interesting treatment are thrown away.



GRASS AISLE AND ROSES
SOUTHAMPTON
MISS A. M. HEGEMAN



FOXGLOVE AND OTHER PERENNIALS
SOUTHAMPTON
GEORGE WARRINGTON CURTIS, ESQ.

The carriage drive may be in reality the principal walk on the estate, so that every endeavour should be made to ensure its attractiveness to the owner and visitor alike.

Naturally no hard-and-fast rules can be laid down, and it is necessary to distinguish between the extent of different establishments.

In this respect there is a curious contrast between an approach to many a weather-beaten ancestral home lying in the heart of a beautiful old park, and the drive leading to a new mansion enclosed in smaller grounds which bear no such evidence of age. With the former there is generally a tradition to maintain a simplicity which is almost affectation. A narrow drive, in many places not more than 10 feet wide, runs modestly through a park filled with magnificent trees, and diverts its course only to find an easier gradient, or to avoid a monster oak or group of other aged trees. This is not an unusual kind of approach to the dull but serviceable forecourt of many fine old piles of masonry. The north side of such a home is generally kept carefully free from the bright colours of garden decoration, and embellished only with a few stone ornaments, time-worn and yellow with lichen. The front door looks out upon a stretch of park land in which deer may be seen browsing in the distance. All the fine gardens are on the sunny sides of the house. This rural simplicity, which never seems mean or paltry, is strictly in keeping with the traditions of the place, and has continued for centuries. On the other hand, very few new mansions possess sufficient maturity to enable them to emulate such dignified simplicity. This is especially the case when the ground through which the drive takes its way lacks the sympathetic association of an old park. Not only do these houses require more ostentatious carriage drives, but they often demand ambitious elaboration in their surroundings.

The lodge and entrance gates should be treated as part of the establishment and not as belonging to a main road. On this theory the lodge will be placed squarely with the carriage drive. This practice will obviate the sudden turn which may otherwise be necessary when entering the gates; a quick change

in direction at the outset is generally a mark of bad planning. The choice between a straight or curved drive naturally depends on several circumstances. It is influenced by the length of the drive, by the contours of the ground, by obstacles necessitating diversion, by some attraction worthy of notice, and most particularly by the angle of sight at which the house presents its most attractive features. When the distance is short, the ground comparatively level, and when one need not trouble about the forecourt being overlooked from the road, a straight drive is generally best. It often invites the planting of an avenue; but this temptation will be rejected when it involves cutting a picturesque ground in half and spoiling many good views. In circumstances differing from those named, a winding approach will generally be arranged, giving an early peep at the house for the purpose of putting one in tune with the surroundings, and breaking into full view at the point calculated to give the best architectural effect. There will be a slight rise towards the forecourt when possible. I do not care generally for the practice of making an avenue of a winding road, inasmuch as it may form a series of incomplete pictures. It is better that neither the forecourt nor the drive should abut on two sides of the house, as it limits the treatment of one garden front, and either interferes with privacy or necessitates inconvenient planting. If the drive crosses a main view from the house, it is often possible to sink it completely out of sight, as at Canons Park. The drive should approach the house by a route which appears to be the nearest practicable, and if an obvious diversion is made for the sake of picking up points of interest, the diversion must carry its own justification. For instance, at Cowdray Park it has been decided to make a main drive which first approaches the beautiful old ruins, for the purpose of obtaining the best view of them, and then it breaks away somewhat, in order to enter a majestic avenue of sweet chestnut trees. These attractions offer sufficient justification for a little addition to the length of the drive, already to be two miles long. At Heath Lodge also the nearest line to the house was rejected for several reasons. It was desired to use part



HOLLYHOCKS AND MALLOWS AND CAMPANULA
KINGSTON
WILLIAMS CARTER, ESQ.

of an existing avenue of chestnuts which would otherwise be wasted; to pass through a pleasant wooded preserve for a short distance; also to avoid the view of a range of glass-houses; and perhaps most important of all was the anxiety to approach a fine Renaissance mansion from the front instead of at an angle which would give a much inferior architectural effect. Such diversions are legitimate, and differ from the practice of wandering out of one's way for the purpose of giving a false idea of the extent of the grounds. Although I have referred specially to mansions in fine parks, the principles laid down are generally true and applicable to houses quite modest in scale with much shorter approach drives. It is frequently considered necessary to prepare an entirely different set of rules for the making of small gardens, but I consider that the inspiration for the arrangement of such gardens arises so frequently from the methods in practice in large ones that an understanding of the principles in force in the latter is a good guide to follow.

Informal gardens are specially suited to a country such as our own, where the climate is so favourable to the luxuriant growth of grass and shrubs that the most satisfactory effects in landscape gardening can be obtained with comparative ease and economy. I will try later on to indicate a few positions in which one form or the other may be preferable, but it may first be worth while to define the root differences between the two styles and to understand what we mean by the words "formal" and "informal."

In some minds there is a tendency to associate the term "formal garden" only with complicated parterres and exaggerated architectural effects, but the definition I suggest gives a more liberal interpretation.

As I conceive a formal garden, it is one in which we frankly dispense with any direct guidance from Nature as to the kind of picture we produce. We allow her little or no voice in the shape of the garden which is intentionally artificial. Although formal gardening does not preclude the full development of trees and plants, the positions occupied by them are strictly defined, and their relation to each other is such as is not seen

in natural planting, except by accident. Formality implies methodical arrangement, and generally carries with it a character of symmetry and regularity.

There is no reason why a formal garden should be lacking in picturesque qualities of a tender and appealing nature.

In the informal garden, on the other hand, we make a pretence of indulging Nature, but, in reality, we persuade her to assume a form of our own choosing. We do not profess to copy Nature, but freely accept hints from her. We select materials from our horticultural treasures and we arrange them in masses and groups which we know Nature can develop to the most picturesque advantage, because we have seen the effects produced in broad landscape, and particularly in the woodlands and glades. An informal garden, nevertheless, should bear evidence of care and attention, and an appearance of refinement in keeping with the house. Although the general shape of an informal garden will not be strictly symmetrical, there is no reason why detached features of regular shape should not be introduced into suitable positions.

The term "informal" does not mean that a garden informally arranged should be without form, for it is an elementary condition that it should be united harmoniously with the house; that is, that neither garden nor house should appear to be isolated, and that each should rely upon the other to give a sense of completion. The walls of the building should be firmly incorporated with a strong base, and the garden also should seem to derive its inception from the same source. This base is usually called the terrace, but it should be understood to consist not only of the raised part on which the house stands, but the whole foundation or setting of the building. The satisfactory effect of the terrace depends on the treatment of the lines of junction with the garden, whether they are terrace walls or grass slopes. They are the critical points of unity, and abrupt effects must be carefully avoided.

Most houses gain in dignity by a certain elevation above the garden, but a perched-up effect should be avoided. When this defect exists, it is generally due to the formation of a terrace

on too mean and narrow a scale. The terrace should not be so broad as to cut off the view. If there is a difficulty in this respect, a comparatively narrow top terrace should be made with a wider one at a lower level. If the levels necessitate three terraces, the lowest should be the widest. A terrace path should end with some feature of interest which will serve as a point for a change of axis.

A good method of creating a sense of unity is to extend the axial lines of the house into the garden, so that from all the principal exits one looks directly into a vista picturing the heart of the garden. The house should also be framed attractively from a few points of view. The tour of the garden may be arranged so that one leaves the terrace from one end and rejoins it at the other, without retracing one's steps in the circuit.

If such a feature as a fine old tree or a group of trees could be associated with the terrace or with a path connected with the latter, a feeling of stability and permanency would be created. The framing of the house by trees, the use of climbing plants on the building, and of shrubs at the point of connexion between terrace and garden, are valuable aids to harmony.

On the question of planning, I propose to say but a few words on one or two of the chief resources at the disposal of the garden designer. We all recognize the importance of a lawn as a factor in garden planning—a factor which unites and gives repose and stability to all parts. The texture of grass is so serviceable that it will carry the eye over a gap, like a sunken road, without any break in continuity. Beyond the garden boundary it will reappear on rising ground and serve again to connect the far distance and bring the entire prospect into harmony. It is not surprising that no substitute can be found to compete with grass as a foreground in garden landscape, and whenever one is in doubt as to what to do with the ground immediately in front of the house, no safer expedient could be adopted than to introduce green sward. Many gardens are spoiled by the notion that this situation calls necessarily for the planting of brightly coloured flowers.



A SOUTHAMPTON GARDEN
MRS. THOMAS H. BARBER



TUXEDO PARK
GARDEN OF GEORGE F. BAKER, ESQ.

The subject of planting requires a volume to itself for adequate treatment. It is the chief factor upon which the attraction of an informal garden depends. The placing of the right kinds of trees and shrubs in their right places is a matter of the first importance. In considering the question one must distinguish between planting for broad landscape effects and the finer and more delicate treatment required nearer home, although in each case the effects of balance and proportion are obtained by means of the proper combination of trees, shrubs, and grass. The great problem is to dispose grass and plants in such a way that from every salient point the exact limits of neither can be traced. The expanse of light on a lawn must be diversified by shadow. When the number of trees is excessive the light and shade effects are without sufficient breadth, and one must therefore try to establish an intricacy which is midway between uniformity and confusion. The site is sometimes so restricted that it offers opportunities for no more than one principal picture. In such a case one should concentrate upon the composition of this one picture as completely as possible, and not spoil it by attempting too much variety.

A landscape effect is always more satisfactory when it is based upon one dominating line of view, because scenes in which two or three vistas are competing for notice produce a distracting and confused result.

The positions of the chief masses of planting must first be settled. These can be decided more or less arbitrarily by the necessity for providing shelter from winds, and screening unsightly objects. Having determined the dimensions and outline of plantings required for purposes of utility, it is not difficult to settle the approximate positions of other large masses wanted to provide a rough balance of composition about a fixed line of view. Small groups should be placed to connect the larger masses, and collections of trees and shrubs or single trees may be added where necessary to complete the appearance of continuity, as well as to produce the effect of intricacy and light and shade. Boundaries should not be planted continuously except for some necessary reason, as unbroken masses

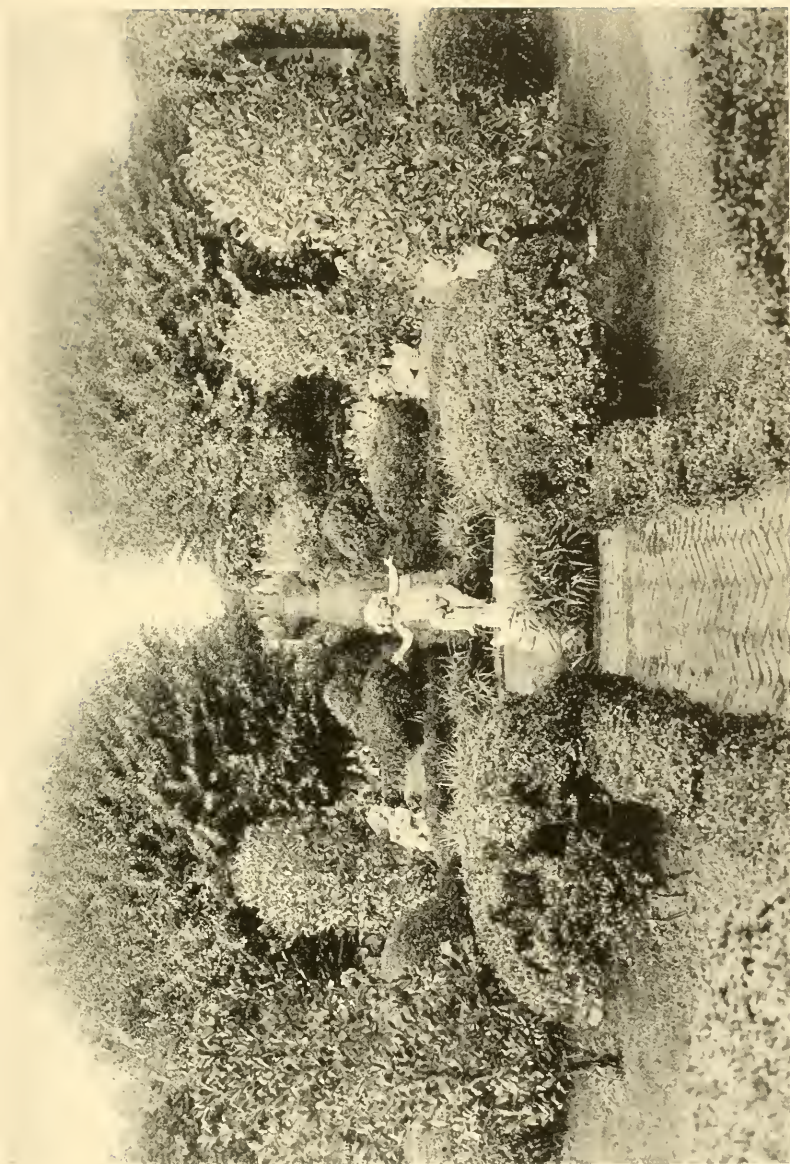
of foliage destroy the sense of space and liberty. Openings should be left to frame some distant object, such as a church spire, a bridge, a ruin or other feature. Many external objects, which scarcely occasion remark when one sees them in the open country, become almost treasured possessions when framed in a garden picture.

In determining the kinds of planting to be employed one must be guided by the texture, shape, and colour of the leaves, and by the size and habit of the tree. A quiet and restful effect will be obtained by planting large masses of the same kind of tree of unobtrusive shade and texture, as not only do they help to show up more conspicuous neighbouring trees, but the employment of a dominant note connects the whole of the planting and increases the feeling of unity.

Foliage of heavy and uniform texture makes the best background for other planting. A group of trees should generally consist of a larger proportion of such foliage than of the lighter and more feathery kinds. Dark and heavy greens should be used for groups in association with old buildings, and lighter shades where less serious treatment is required. Light and feathery trees are most suitable near water. The temptation to plant in a small garden a medley of single trees of the brightest colours that can be found should be resisted. There are so many trees of beautiful form and texture which have lovely flowers in the spring and exquisite tints in the autumn that there should be no question of using them rather than an excessive number of trees of brilliant foliage.

There are endless opportunities for study in the harmonious association of the leaves of trees, but it is almost impossible to give any governing rules.

The combination of foliage in colours which are rightly contrasted is generally more effective than that in which the shades are somewhat similar. Daring tints can frequently be harmonized by the introduction of a green or greyish hue and yielding habit. Foliage of the type of the sea-buckthorn will make peace between the colours of almost any two plants which are inclined to clash.



A CHARMING GARDEN VISTA
SOUTHAMPTON
J. L. BREESE, ESQ.

I should have liked to say something about the fascinating subject of flowering shrubs, and the infinite possibilities of their use, but that topic, I am afraid, is too wide-reaching to deal with now, so I regretfully pass it by.

It might be asked, in giving such dominant importance to the matter of trees and shrubs, where one should grow the flowers, upon which depend the gaiety and intimate pleasure of the garden.

Ample provision for flowers can be made, but it should be remembered that the informal garden is generally more picturesque and inviting during winter than a formal garden, and if this advantage is to be retained the chief views should not be monopolized by the reservation of large areas for flowers, as these necessarily present a bare and desolate appearance in winter. Flower-gardens should be arranged in positions which appear to be subordinate to the planting. For these plenty of suitable situations can be utilized.

There are opportunities for symmetrical arrangements on the terrace, and borders can be made against terrace walls. Large masses of flowers may be arranged with shrubs in the background, the effect being particularly good where grass alleys wind between plantations bordered by flowers.

Flower-beds may be placed suitably at the intersection of paths. Special gardens—rose gardens, rock gardens, water gardens, and other similar features—may be constructed in sheltered, but not shady, parts of the grounds. Bulbs are most effective when planted in large numbers in grass and glades; the kitchen garden should have its flower borders, and if it is encompassed by walls or hedges there is often the chance of using the outside of these boundaries as a basis for some enclosed garden. The informal garden offers opportunities for the introduction of as many flowers as one could wish, and does not merely represent a collection of trees and shrubs, which, naturally, are not sufficient to satisfy most people's idea of a garden.

The majority of the large gardens in England can scarcely be described as either strictly formal or informal. The kind of

garden recognized as distinctly English is perhaps expressed by a happy assimilation of all styles in a harmonious fashion.

The historical records of gardening deal mainly with different types of the formal garden. The most famous are perhaps to be found on the hillsides of Italy. They provide many lessons in imagination and architectural detail and in bold treatment of various situations.

Another historical example of the formal garden which has exercised great influence, not only on the design of formal gardens in England, but on the history of English gardening, is that associated with the great French garden architect, Le Nôtre. The style he perfected came to grief in the hands of men of less imagination, and the tedium produced by constant repetition of design facilitated the great revolution of informal landscape gardeners in this country a century and a half ago.

Nevertheless, the design of many of the older formal gardens of Great Britain still shows traces of the style of Le Nôtre. The world-wide influence he must have exercised is evident in operations under my own control at the present moment, for I am dealing in three foreign countries with gardens of which the original design is attributed to him. The general principle of each of these gardens is very familiar. The expenses of construction must have been enormous, and, considered from our present standpoint, one may wonder if the result was worth the outlay. The details are very intricate and ingenious, but they do not offer opportunities suited to the horticultural instincts of English gardeners of the present day.

I may instance the ground plan of the parterre at Drottningholm, the chief residence of the King of Sweden, which I have visited professionally during the last two summers. The original gardens remain in outline framed by the avenues as planted. These avenues consist of magnificent old limes, but unfortunately some are missing. The suggestion to cut down the whole of the trees remaining and to replant the avenues with young trees was referred to me. I feel sure that if I venture to do such a thing in England I might as well retire from my profession. One can scarcely say that a lime tree is

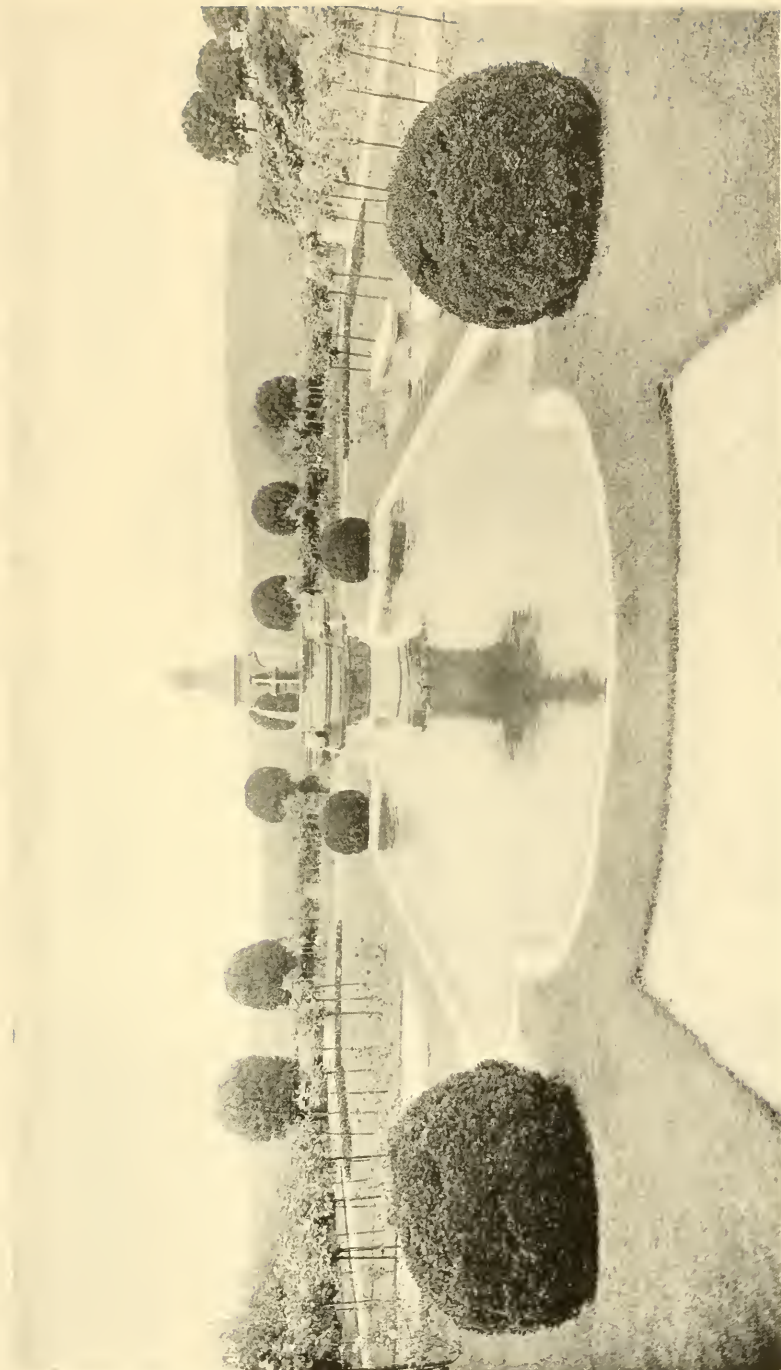
dead until it is cut down, as it has so much recuperative power. I therefore suggested that a quarter of the roots of these old trees should be pruned in successive years, that fresh soil should be added, and that vigorous young trees should be planted to fill up the gaps.

The question also arose as to the desirability of reinstating the details of the old plan. In view of the historical interest of the royal garden, which was to all intents and purposes a public park, I thought the idea was justifiable, and preferable to working out a new design.

In one of Le Nôtre's gardens near Berlin, the main form was originally very similar to that of Drottningholm, but it has been much Germanized during the last century, and the only original feature which remains is the long central avenue, which extends for a distance of half a mile. The interior of the garden, when I first saw it, had been converted into thickets of trees and undergrowth, through which there were a large number of walks winding about in every direction, regardless of any definite plan. The best course appeared to be to make the most of the central picture on the line of the main avenue; to provide a strong terrace base as a line of junction between the house and the garden; to reduce the number of paths, and to give definite purpose to those retained; to cut up the woodland into a series of glades and vistas; to isolate some of the best single trees, and to form groups of others standing in grass.

It seemed hopeless to attempt to incorporate any flower-gardens with the landscape effects beyond the introduction of flowers suitable for woodland, so we made elsewhere a series of special flower-gardens, which were connected with the main terrace.

Another example of Le Nôtre's gardens which I have visited is near Tours, in France. Here again the general plan is very much the same. The original avenues of limes exist and are very imposing. The château was built in the time of Louis XIV. A large moat was dug, but was never filled with water, for the reason—so I was informed—that the King wished to discourage the fortified strength of the castles of the day. We



FOUNTAIN AND POOL
TUXEDO PARK
H. M. TILFORD, ESQ.



"BELLEFONTAINE"
LENOX
G. FOSTER, ESQ.

are now going to make rose-gardens in the moat. Elaborate parterres were designed originally, but I do not think they were ever constructed. The ground is at present level, and, as long as records exist, has been nothing but a large lawn.

In this case I was asked to plan a garden somewhat on English lines, but appropriate to the position—a rather difficult matter, as the style of the château is characteristically French.

Designs of the type developed by Le Nôtre have influenced for many years the formal gardens of England. Many places to this day contain specimens of his parterres on a more or less large scale, but for their full effect they require such immense areas of flat land that in many situations they would be impracticable, even if one wished to have them. They are dignified, and the avenues provide very fine effects, especially in the autumn, but the gardens are tedious, and one welcomes by contrast the composite construction of English gardens, in which there is less formality and more intimate feeling.

An interesting part of the work of a landscape gardener deals with the reformation of grounds of mature age, and presents a crucial test of his capacity.

In such operations he has not only to select existing features which are worth retention, need improvement, or deserve removal, as the case may be, but he must take care that all new work is in harmony with the best of the old, and particularly that his additions do not outbid the importance of the building. When the alterations assume a formal character there is a special tendency to fall into this error, with the result that the centre of attraction is wrongly shifted from the house to the garden.

Many places date from a period when horticultural details were banished to enclosures at some distance from the house, and the grounds were arranged chiefly to provide landscape effects and necessary shelter.

At the present day fully grown trees monopolize the sunlight, impoverish the soil, and occupy all spaces not required for vistas. On a bright day these conditions are attractive to the newcomer, but people who live with them often desire

more interesting surroundings, and it is a difficult matter to provide them without spoiling the prevailing breadth and peace of the place.

In such circumstances the fact must be faced that the prevailing note is given by the large trees, and that the repose they afford cannot be enjoyed fully in an outlook which also presents the colour, vivacity, detailed interest, and possibly the seclusions sought for in a modern garden.

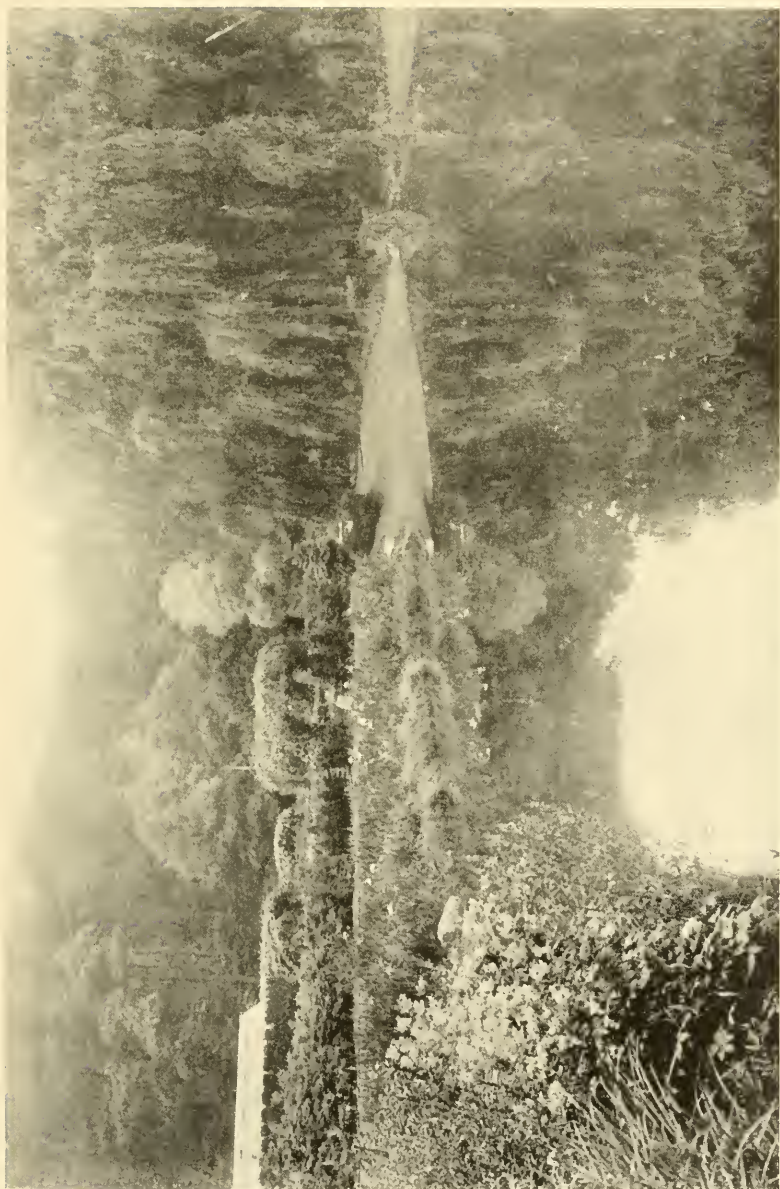
When one wishes to keep most of the trees the best course is to make new gardens, so to speak, *en suite* devoted to flowers in some convenient position clear of the chief views. These gardens should be connected by an important-looking path, with the terrace from which possibly one may arrange a glimpse of colour to indicate where the flower-gardens are to be found. Flowers can also be planted against backgrounds of shrubbery planting, and additional colour may be introduced by planting flowering trees.

In grounds of the kind described the effect of isolated flower-beds is rarely harmonious. When a house stands on ground even slightly raised, the construction of enclosed terrace gardens sometimes forms an interesting improvement, and the sacrifice of a few trees may be justifiable. Better still if they are so happily placed that one can work them into the plan.

The general failing of an old establishment is that in early days too much (or too little) respect was paid to badly placed trees, which in the end do not assist picturesque composition in spite of individual beauty.

How often a fine tree obstructs a good view! Half of a landscape gardener's work arises from differences of opinion on the question of removal. It is sometimes possible to satisfy each party to a controversy by removing a few branches to expose the view enhanced by the framework of the tree, otherwise the expert will be a very clever man if he succeeds in pleasing everybody.

A satisfactory effect is offered by a group of trees of which the stems are very close together, the branches combining to make one well-balanced head. It is less agreeable when trees



WATERSIDE PLANTING OF TREES AND PERENNIALS
MANCHESTER-BY-THE-SEA
MRS. FRANK P. FRAZIER



"A SUCCESSFUL ITALIAN FEELING"
SOUTHAMPTON
MRS. H. F. BOARDMAN

are farther apart but so close that they spoil each other. One good tree is preferable to two badly grown, and the sacrifice of the weaker is always worth consideration.

Ill-directed zeal is responsible for the muddle into which many gardens have drifted. Almost invariably in places governed by no ordered plan the day arrives when it is found necessary to try to pull things together into some coherent scheme. What is radically wrong calls for radical methods of remedy, and a firm handling of the plan is generally needful.

It is best to begin at the beginning—that is, with the drive and forecourt—and to correct such difficulties in dealing with the garden as arise from bad planning in this respect. The next point for attack is the terraces or ground surrounding the building, which should be established as a *pied-à-terre* preparatory to the reconstruction of the garden.

The evolution of a spirit of harmony in a place full of features interesting individually, but discordant as a whole, is a fascinating problem. The details in the garden worth retention should be well considered, and one should try to unify them in a logical manner, supplying such links as may be missing. The paths are the threads on which the ornaments are strung, and no path should exist which is unnecessary. I prefer to arrange one grand tour which takes one successively to all of the chief features of enjoyment without any retracing of steps. The items of interest in the garden should be well proportioned in relation to the length of the tour, and when this principle is observed it assists generally in preserving the balance of composition of the whole garden in the picture surveyed from the house.

Some of the most enjoyable work which falls within the province of a landscape gardener is associated with the renovation of an old garden which contains a wealth of material ready to hand. Notwithstanding what I have said about radical methods of remedy being sometimes necessary, those who love their work will not approach it with a preconceived idea of turning everything topsy-turvy. The highest triumph of an artist is to evolve a beautiful thing with the least apparent effort and the greatest economy of material.

*The History and Development of the Strawberry**

By E. A. Bunyard, F.R.H.S.



THE study of the history of cultivated fruits is attended with many difficulties, and not the least among them is the lack of definite records when such history extends into remote pre-historic periods. In the case, however, of the Strawberry such impediment does not exist, as the whole period of its development has occurred in comparatively modern times. This study is further made easier by the fact that from the earliest days of the history of the modern Strawberry there have been amateurs who recorded its progress with great exactness. We enter, therefore, upon this subject with a large body of precise historical detail which no other fruit can parallel.

The Strawberry thus offers peculiar opportunities for the study of the evolution of a fruit in its scientific as well as in its horticultural aspect and while the latter is the principal consideration of this paper, the former will also be kept in view. The idea of a progressive increase in size and flavour owing to the effects of cultivation is one that is still held, and it will be of interest to see what support the history of the Strawberry can afford to this conception.

The first species of Strawberry which will be considered is *Fragaria vesca* L., a native of Europe, and especially of its northern parts. This is the species which has been known to horticultural writers since the days of Pliny, and of which the herbalists make frequent mention. It is well known that this

* From a paper read October 7, 1913, before the Royal Horticultural Society and reprinted from the *Journal* of the Society, with the kind permission of the Secretary.

Strawberry varies in the wild state. A white form, a sterile form, and a large-fruited variety have been frequently noted. These variations, therefore, are obviously not due to cultivation, and the early gardeners may have cultivated either of these forms.

It is not easy to fix an exact date for the first mention of the Strawberry, but it is generally held that to Nicolas Myrepsus, a Greek doctor of the thirteenth century, must be accorded the honour. Both in Greek and Roman literature the *Arbutus* and the Strawberry were given a common name, a result of the theory of affinities then so much in vogue. Pliny, however, distinguished the difference in flavour, and the name "fragum" must, no doubt, have been first applied to the fragrant Strawberry. It does not seem, however, that it was then a cultivated plant, and it is usual to place its introduction to cultivation in the fifteenth century. There is, however, ample evidence that it was found in gardens long before this; documents exist which prove it was thus grown in the early part of the fourteenth century in France. The Royal Gardens at the Louvre under Charles V possessed no fewer than 1200 plants, and many other records testify to the appreciation of the fruit by its presence in French gardens at this period.

From this time onwards the Strawberry has been under cultivation in gardens, and it will be interesting to see what improvement this long-continued period has affected.

The earliest illustration of the Strawberry in the Middle Ages is that to be found in the Mainz *Herbarius* of 1454 (p. 63), and a better illustration still is found in the *Gart der Gesundheit* (*Ortus sanitatis*), Mainz, 1454, cap. 190.

The first work in which Strawberries are treated purely from the horticultural standpoint was the *Théâtre d'Agriculture* of Olibier de Serres, 1600. Here we find the Strawberry valued as much for its decorative use as for its fruit. It is recommended that plants should be taken from the woods, as the transplantation to fresh soils will increase the size of the fruits. This improvement, however, was recognized to be due only to the freedom from competition with other plants and to the extra



FRAGARIA VESCA L.



FRAGARIA MONOPHYLLA DUCH.

FRAGARIA MONOPHYLLA DUCH.

vigour obtained by the removal of runners. The wild Strawberry had therefore at this time been grown as a garden plant for some 300 years, and no improved variety had so far been recorded. This fact is worthy of notice, as at this time the American varieties, which have played so important a part in the development of the modern Strawberry, had not reached Europe. There are, therefore, no complications of cross-breeding, and the effect of cultivation alone is concerned, and in this case it did not cause any improvement of the type.

It may be here objected that varieties of *F. vesca* of increased size do now exist, and that they may not have arisen through cross-breeding but by continued cultivation. There are, however, instances recorded where large-fruited forms have been found in a wild state. In Weston's *Botany*, vol. iii, p. 325, is mentioned the Northumberland Wood Strawberry, "the size of a small nutmeg, finer than the garden kind." This was found wild by a stream near Newcastle.

From this and analogous cases it is evident that the production of large-fruited forms is not always and only associated with cultivation.

The history of the modern Strawberry may be said to date from the early seventeenth century as the introduction of *F. virginiana** took place about this time; but before we study the influence of this new species the varieties of *F. vesca* which have appeared may be briefly considered. In 1890 the curious *F. eflagellis* was first mentioned. This form, as its name indicates, produces no runners, and its compact habit has given rise to the name "fraisier buisson." This is obviously a variety produced by the loss of a unit character, and cannot be claimed as a horticultural improvement. It is interesting to note that large-fruited varieties have also given seedlings which failed to form runners.

The one-leaved form, *F. monophylla*, has a curious and interesting history, which shows how identical sorts may arise both under cultivation and in the wild state at different periods.

* [This is one of the commonest wild strawberries of the fields and pastures of eastern North America—Ed.]

The first record of this form is in a picture by Holbein, which is now in the Pinakothek at Munich. This must have been painted in the early part of the sixteenth century. Secondly, it was recorded by Linnaeus as occurring wild in Lapland, and lastly its appearance in a bed of *F. vesca* at Versailles in 1761 is described by Duchesne.

The next variety of importance was the so-called Alpine Strawberry, the origin of which has been the cause of much discussion. The sole point of difference from *F. vesca* is its habit of producing autumnal fruits. As is well known, *F. vesca* will, under certain conditions of moisture and temperature, produce retarded flowers late in the season, and this fact makes it difficult to distinguish it, when growing wild, from the true Alpine variety, in which the autumnal production is a definite and regular character. The first mention of this variety is probably that of Jerome Bock or Tragus in 1530. Conrad Gesner also mentions it, and his description leaves no doubt of its identity. "*Fraga vera tota aestate florent inque maximam autumni partem*" (*De Stirpium Collectione*, 1553). His special study of alpine flora rather tends to the opinion that this plant is not of garden origin. It was probably not until the eighteenth century that it became a garden plant. About 1768 it was described by Miller in his *Dictionary* as a rarity, and it was generally believed to have been introduced from Turin. From this time it was rapidly distributed in Holland and France. In 1764 Duhamel du Monceau received seed from Mont Cenis, which would seem to establish its alpine origin.

Since this date many varieties of this species have appeared in gardens. The most striking was the "Gaillon," so called from the locality of its origin, where it was found by M. le Baudé about 1825. This is a variety without runners which is known in France as the "buisson," and is still largely used for borders in the kitchen garden. Red and white fruited forms exist, as also in the original Alpine Strawberry.

Many varieties with large fruits have been since brought forward. In 1855 the "Reine des Quatre Saisons" was introduced by M. Gautier, a cultivator who made a fortune at the time of



F. DES ALPES

THE ALPINE STRAWBERRY

the Second Empire by the cultivation of Alpine Strawberries for market. The great popularity of the Alpine Strawberry at this time caused the forcing of this variety to be largely undertaken, and growers selected their own seedlings and kept the stock carefully to themselves, and they were known on the Paris markets by the raisers' names. The well-known "Millet" was one of these. It is, of course, impossible to say how much, if at all, these improved varieties owed their size to crossing with other larger-fruited types, but the following experiment of M. Henri de Vilmorin is of interest in this connection.

Plants of Alpine Strawberries growing in the neighbourhood of Bargemon, the locality which is generally considered as the first source of the alpine form, were planted in the experimental garden. These plants produced fruit in the second year which was equal in size to the "improved" varieties such as "Janus," "Belle de Meaux," and "Berger."

This remarkable experiment may, of course, be claimed as a result of improvement by cultivation, but on the other hand it may be remarked that if cultivation for over 100 years produces no greater result than that resulting in one year, its effect is, to say the least, limited. Fuller details will be found in the *Revue Horticole*, 1902, p. 410.

Having now traced briefly the development of *F. vesca* and its alpine variety to modern times, it is necessary to return to the other European species, *F. elatior*, the Hautbois Strawberry, and to see what cultivation may have done for this species.

Growing wild in Europe, though in a less extended area than *F. vesca*, it was of course especially likely—on account of its strong musky flavour—to be introduced to garden culture. It is not, however, specified by Oliver de Serres in the *Théâtre d'Agriculture*, but the botanists of the sixteenth century frequently mention it, as for example Dodonaeus. The garden varieties produced have not been many, but the "Royal," "Framboise," and "Apricot" had for some time considerable popularity in France, and in England the "Black," "Globe," and "Prolific" were at one time much cultivated.

To the end, therefore, of the sixteenth century the two European species of Strawberries had been cultivated without attaining any remarkable increase in size, and all the varieties recorded were such as were easily distinguishable, as but slight variations or defective varieties of these species.

In the early part of the seventeenth century the Virginian Strawberry was introduced into Europe. The exact date of its arrival is uncertain, but it was recorded in 1624 by Jean Robin, botanist to Louis XIII. Tradescant was then making his journeys on the Continent in search of novelties, and it is probably to him that we owe the introduction of this species into England.

The bright colour and good size of this fruit led to its extended cultivation, but it is remarkable that, notwithstanding the variations of soil and climate to which its introduction to England and France must have exposed it, more than 100 years elapsed before any variation appeared. Duchesne, in 1766, speaks of a variety from Strassburg having longer fruits than the type, and a similar variety called the "Oblong Scarlet" was raised by Mr. Gibbs, a nurseryman at Old Brompton, some time before 1826.

About this period many new varieties appeared, such as the "Grove End Scarlet," raised by William Atkinson at Grove End, Marylebone, in 1820, the "Duke of Kent's Scarlet," "Knight's Large Scarlet," etc.

Many varieties were also raised from seed imported direct from Canada and North America, and some of these showed some slight differences, but not more than might have been met in the wild state.

We see, therefore, that *F. virginiana*, left merely to the stimulus of cultivation, did not produce any varieties of special size or remarkable in other qualities, and it was generally admitted that for flavour the original type was unsurpassed. Nothing at all approaching in size the Strawberry of modern times had been produced, and the reason of this was, doubtless, that no character giving large fruit had been introduced into the gametic constitution of existing fruits.

The introduction of the Chilian Strawberry, *F. chiloensis*, brought, however, the required size into combination with the flavour of the Virginian, and thus laid the foundation of the fruit as we know it to-day. The introduction of the Chilian Strawberry was, therefore, an event of the first importance in Strawberry history and deserves detailed treatment.

Fragaria chiloensis is found wild in Chile, principally in the Chonos Archipelago, in Valdivia, and the Juan Fernandez Islands. It is also found on the Pacific coast region of North America and in Alaska. It is the Southern form only, however, which we are now considering. The general character of the plant is well shown in our figure, and the colour of the fruit is a yellowish-rose, shading to a rather darker tint. The variety "Louis Ganthier" is a close approximation to the wild type.

The Spanish name "Frutillar" was adopted by Duchesne and translated into "Frutiller," by which name it was long known in France.

Its introduction to Europe was due to a French officer named, by a curious coincidence, Frezier, the name being a Gallitized rendering of the Scotch Fraser, from which stock he was descended. In his travels he found this Strawberry both wild and cultivated, and its large size induced him to attempt its introduction into Europe. The long journey from Chile to France and the scarcity of fresh water rendered the importation of the young plants a matter of some difficulty, but five plants survived. One of these was planted near Brest and became the parent plant of the large Strawberry industry still carried on in that district. The plants happened to be all females, and for some years no fruit was seen, from lack of pollenizers. Duchesne, of whom we shall speak in detail later, succeeded in fertilizing it with the "Hautbois," and fruit resulted. In the district of Brest it was planted among other varieties, and thus, being naturally pollenized, large crops were produced. In 1857 180 hectares are said to have been occupied by this variety, and it was exported even to England. It was not long before seedlings were produced, the most widely cultivated being the so-called "Pine" or "Ananas" Strawberry.



FRAGARIA VIRGINIANA L.

FRAGARIA VIRGINIANA L.

Much discussion arose over the origin of this fruit, which was first figured and described in the seventh edition of Miller's *Dictionary*. Among the countries to which it was referred was Surinam, and it was for long called the Surinam Strawberry. The Comte de Lambertye, the great historian of the Strawberry, leaves the question of origin undecided. There is, I think, no doubt that it is a seedling of *F. chiloensis*, and a passage in Duchesne's *Histoire des Fraisiers*, which seems to have been overlooked by previous writers, establishes the point. In a note of recent observations printed at the end of his book the following passage occurs.

Les graines des Frutilles envoyées de Cherbourg en 1764, et semées tant dans notre jardin qu'à Trianon et au jardin du Roi, y ont produit de véritables Fraisiers-ananas. Nous venons de l'observer dans leurs premières fleurs, qui sont hermaphrodites parfaites. Cela nous apprend l'origine du Fraisier-ananas, et quelle est la dégénération ordinaire du Frutiller en Europe.

Other varieties which showed evidence of descent from this species were the "Carolina" and the "Gath," and *F. grandiflora*. The differences between these varieties were very small, and constant confusion resulted as to which was the true type. Lambertye considered them identical.

Having now described the introduction of the species which provided the material from which the Strawberry of our time has been derived, it remains to show the means by which this has been raised to its present perfection, and to say something about the workers to whom it was due.

Though the fact of the separation of the sexes in plants had been partly realized by the Egyptians and Greeks, it was not fully understood until much later days. Bacon, in his *Natural History*, saw the possibilities of cross-fertilizing for the production of new varieties, but his suggestion bore no fruit until the experiment of Bradley and Miller in the eighteenth century. These were, however, concerned with flowers, and it is probable that the first crossings of fruits were made by Duchesne, whose *Histoire Naturelle des Fraisiers* forms the starting-point of the



FRAGARIA CHILOENSIS DUCH.

literature of the Strawberry. This remarkable writer was born in 1741 at Versailles, where his father was Inspector of Buildings. The wonderful horticultural collections in the gardens of the Trianon were at the disposal of the young student of botany, and to such good use were they put that at the age of seventeen he published his first work, the *Manuel de Botanique*, and two years later his monograph on the Strawberry appeared. In this work the varieties of this fruit are described with the greatest minuteness and an attempt is also made to classify them genealogically, a notable undertaking when the then current botanical doctrine of constancy of species is considered.

In other ways Duchesne showed great independence of mind, and to devote a book to the accurate description of garden plants at the time of Linnaeus was in itself a bold departure. As an example of careful observation his study of the cause of sterility of the "Hautbois" may be quoted. Current opinion held that this fruit was degenerating, as it was becoming less fruitful. Duchesne was able to show that the cause was the gradual weeding out of the male plants on account of their infertility, thus leaving the female plants without pollenizers. This cause had been overlooked owing to the fact that both plants were apparently hermaphrodite, but the anthers in the female plants, though present, bore no pollen, and similarly in the male plants the ovaries did not function.

It is not possible here to refer in fuller detail to this interesting book or its writer. Suffice it to say that the *Histoire Naturelle des Fraisiers* remains a classic in Strawberry literature, and a book to which all historians of this fruit must constantly refer.

The stimulus which might have been expected to result from this work in France was lost in the confusion of the Revolution, when gardeners found uses for their pitchforks outside the seclusion of their gardens, and many pruning-hooks were beaten into swords.

It was in England that the next chapter of Strawberry history was written, and to Thomas Andrew Knight and Michael Keens must be given the honour of laying the foundation of the Strawberry of the present day. As has been stated above, the

two most important species had existed for some time in England, and it was to the crossings of early descendants of *F. virginiana* and *F. chiloensis* that his success was due. At the end of the eighteenth century a well-furnished English garden would have contained the following varieties and species: *F. vesca*, *F. elatior*, and their varieties as described above; *F. chiloensis* and its varieties, "Carolina," "Pine" or "Ananas,"



ANTOINE NICHOLAS DUCHESNE

and *F. virginiana* and its varieties "Duke of Kent" and "Austrian Scarlet."

The credit of raising the first large-fruited Strawberries belongs to Michael Keens, a market gardener of Isleworth. Having been a raiser of seedling fruits for many years, he chose in 1806 some seeds of the Chile Strawberry and obtained many seedlings, mostly white, but one of outstanding merit was found and named "Keens' Imperial" (*Trans. R.H.S.* vol. xi, p. 101, coloured plate). The importance of this fruit in Strawberry

history is due to the fact that it was seed parent to the renowned "Keens' Seedling" which was produced in 1821. The large size and excellent flavour of this fruit created a sensation which probably no succeeding Strawberry had ever equalled. The Royal Horticultural Society showed its approval by a coloured plate in its *Transactions* (vol. v, p. 261), and by presenting the raiser with a silver cup. It is interesting to know that this cup exists in London at the present time. In many respects it may be said that this remarkable fruit is hardly surpassed at the present day, and though in some one aspect or another varieties may be found which outclass it, its influence as the principal parent of the large-fruited race of Strawberries cannot be overestimated.

The success, however, of Keens was rather in the nature of a happy chance, and it is to Thomas Andrew Knight that we owe the first scientific attempt at Strawberry breeding on a large scale. The first account of Knight's work was printed in the *Transactions of the Royal Horticultural Society* (vol. iii, p. 207). From this paper it is evident that extended experiments had been made, as he states that all the available varieties and species of Strawberries were found to breed together, and that he considered them therefore to be all "varieties of the same plant." Over 400 seedlings resulted from the above crosses, some of which later became famous.

The first of these was the "Downton," which is described and figured in the *Transactions* (vol. iii, p. 396). The female parent of this variety was raised from seed imported direct from America by a Mr. W. W. Capper, of Birmingham. From what part of America they were received is not specified, but the fruit was classed as a Virginian. This was pollenized by the "Old Black," a variety of uncertain origin. The result was a large oblong fruit showing many resemblances to *F. chiloensis*. In view of the uncertainty which exists as regards the origin of its parents, the "Downton" cannot be claimed as a definite case of a *virginiana* × *chiloensis* cross.

The second variety which was raised by Knight was the "Elton Seedling." This fine fruit quickly established itself as

a good late variety, and may be found still in cultivation. Of its origin there is no record.

These two varieties of Knight's, and "Keens' Seedling," are of the greatest importance in the history of the Strawberry. Their appearance created something of a furore. In France they were welcomed as the greatest advance so far achieved, and for many years these large-fruited sorts were there known as "Fraises Anglaises."

This great success had the result of stimulating breeders to fresh efforts, and in this country many varieties of great excellence soon appeared.

Mr. John Williams, a successful raiser of many fruits, whose memory is kept alive in the many varieties bearing the name of his house "Pitmaston," was among the first in the field; and though his Strawberries are now almost out of cultivation, they took for some time a leading place.

Myatt, of Deptford, introduced in 1840 his most famous seedling "British Queen," which is yet one of the best flavoured. "Admiral Dundas" (1854), another seedling, was long a standard variety, and "Eleanor" (1847) is still grown with success. His seedlings are believed to have been raised from Knight's varieties.

Another successful raiser in rather later days was Bradley, gardener at Elton Manor, Nottingham. He succeeded in producing two magnificent fruits, "Sir J. Paxton" (1862) and "Dr. Hogg" (1866), both of which are too well known today to need

The impetus given by Knight and Keens spread rapidly also to the Continent and America. In France Plevain introduced in 1844 "Princesse Royale," a variety which was for more than fifty years the leading French fruit. His "Comte de Paris" was raised in 1846 from a seed of "Elton," showing thus the influence of the English stock. In 1852 the firm of Jamin raised and introduced the well-known "Vicomtesse Héricart de Thury," and in 1865 Berger, of Verrières, raised the variety "Dr. Morère." This fruit in France is now as widely grown as is "Royal Sovereign" in England, and is very probably a descendant of "Elton."

In America "Keens' Seedling" was soon introduced, and already in 1837 a seedling of great merit, "Ross Phoenix," had been raised from it.

Space will not permit a detailed report of the varieties raised in Germany by Goeschke, in France by Gautier, Dr. Nicaise, and Gloede, and in Belgium by De Jonghe. Many of their seedlings had a vogue in this country for many years, but they were overshadowed by the remarkable work of Laxton in England, who initiated and carried on a series of experiments in Strawberry raising which have probably never been equalled in extent.

Thomas Laxton started his experiments about 1865, and from the first carried them out with the greatest perseverance. His first work was mainly with garden peas, but on his removal to Bedford in 1878, when he was able to devote his whole time to cross-breeding, he gave much attention to the Strawberry. His first great success was with "Noble," which was introduced in 1884. This variety was probably the only one of his introductions which was a natural hybrid. The same year saw the first appearance in commerce of "King of the Earlies," "Duchess of Edinburgh," "Captain," and in 1892 "Roal Sovereign" appeared. This remarkable variety, a cross between "King of the Earlies" and "Noble," was in its way as great an advance as "Keens' Seedling," and it still remains the type of highest excellence. Its influence on succeeding varieties has been great, but it may safely be said that since its day no new sort has stood out with such prominence.

Since then the greatest advance has been in the production of later varieties. "Latest of All" was introduced by Laxton Brothers in 1894, and "Givons Late Prolific," raised by Mr. Peters, of Givons Gardens, Leatherhead, provided a new standard for these later fruits.

Of the autumnal fruiting varieties it is not necessary to speak in detail, as a full and lucid account was given by M. Henri de Vilmorin in the *Journal of the Royal Horticultural Society*, vol. xxii, Part 3 (1899). The combination of the large size with the autumn-fruiting character was only reached after much

disappointing trial, and it was not until the introduction in 1893 of "St. Joseph" that a really satisfactory result was accomplished. Since then many excellent varieties have been brought forward, and one of the latest, "St. Fiacre," which was introduced in 1911, probably represents the highest achievement in this section.

Having now briefly discussed the development of the Strawberry and the work of those to whom it was due, there remains another class of workers who, though not raisers themselves, were interested in the fruit on the systematic or literary side. The first of these was Duchesne, of whom mention has been made above.

The next detailed treatment of importance is the remarkable paper published in the *Transactions of Royal Horticultural Society*, vol. vi, p. 145 (1826). This was contributed by Mr. James Barnet, under-gardener in the fruit department at Chiswick, and was presented in 1824. The descriptions of the fruits and also of the plants, and the clearing up of the many synonyms, all show a master hand, and it is safe to say that had this monograph been published in book form the author would have occupied to-day a prominent place among those who have written on the Strawberry. It may be remarked in parenthesis that Robert Thompson has shared a similar fate. His excellent monographs on the apricot and the cherry well deserve re-publishing. In 1857 the paper of Gay upon the species and distribution of the Strawberry was published (*Annales des Sciences Naturelles*, Série 4, Botanique, VII, pp. 185-208). This is, of course, mainly of botanical interest.

In the same year the *Jardin Fruitier du Muséum* of Decaisne was published, and the part dealing with Strawberries was entrusted to Madame Elisa Vilmorin, who had, at Verrières, gathered together a remarkable collection of these fruits. The descriptions in this work are evidences of the keenness and ability with which these studies were carried on. By the courtesy of M. Maurice de Vilmorin I am enabled to give the accompanying portrait.

The next writer of prominence was the Comte Léonce de

Lambertye, whose book appeared in 1864. This writer spent the years of his country retirement at Chaltrait in growing all varieties of Strawberries obtainable and in the study of their



MME. ELISA VILMORIN

history and literature. No more complete work on this fruit has ever been published, and for the history of Strawberry development up to his day it stands unrivalled.

In 1874 Franz Goeschke published his *Buch der Erdbeeren*, which treats of the botanical and cultural side mainly, with excellent descriptions of a large number of varieties. Except for the historical portions, it fills the same place in German literature as does Lambertye's work in French.

Since this date many small works have been published (for which see bibliography at end), but no important descriptive book has appeared.

So much careful work has been done in the study of Strawberry history that it is not possible to discover much that is new. It may be well, however, to emphasize once more the great importance of the work of Keens and Knight, as this has been overlooked by previous writers. No chapter in the history of the Strawberry is more important both from its practical and from its scientific aspects.

In conclusion the writer submits that the history of the Strawberry offers but little support to those who believe in the paramount influence of cultivation in the production of new forms. Its entire development has been due to the introduction of new species having some quality not possessed by existing varieties and its admixture with these by cross-breeding.

Bibliography of the Most Important Works On the Strawberry

Only such works are noted as deal mainly with the Strawberry or contain original descriptions.

1766. *Histoire Naturelle des Fraisièrs*. M. Duchesne Fils. 8vo. The first monograph on the Strawberry, and of the greatest importance. A second edition was published in 1786.

1824. "An Account and Description of the Different Varieties of Strawberries which have been cultivated and examined in the garden of the Horticultural Society." By James Barnet, under-gardener in the Fruit Department. *R.H.S. Transactions*, vol. vi.

This most valuable paper represents real work in description, classification, and the rectification of nomenclature. It is the source from which numerous later writers have drawn, with and without acknowledgment.

1857. "Recherche sur les Caractères de la Végétation du Fraisier." By S. Gay (*Annales des Sciences Naturelles*, Série 4, Botanique, VII, pp. 185-208).

Dealing chiefly with botanical characters and geographical distribution.

1857. *Le Jardin Fruitièr du Muséum*. Descriptions of Strawberries by Madame Elisa Vilmorin.

Gives valuable descriptions and figures of nearly all species of *Fragaria* and of the principal garden varieties of the day. The plates of this work are of an excellence never since equalled.

1864. *Le Fraisier, sa Botanique, son Histoire, sa Culture.* Par le Comte Léonce de Lambertye.

The most complete work ever published on the Strawberry, representing the study of many years. No figures or plates.

1865. *Les Bonnes Fraises.* By Ferdinand Gloede.

A small work of a popular nature, with cultural notes and short descriptions.

1866. *Die Himbeere und Erdbeere.* By Dr. E. Regel.

Short descriptions of species and varieties, with poor coloured plates of little merit (44 pages).

1874. *Das Buch der Erdbeeren.* By Franz Goeschke.

Deals with culture, botanical characters and garden varieties, somewhat after the style of Lambertye. Twenty-seven woodcuts of fruits.

1898. *Les Fraisiers.* By A. Millet. Fifty-two engravings.

An excellent work, treating all branches with clarity and exactitude. Many valuable historical details.

1899. "Perpetual Strawberries." By M. Henri de Vilmorin. *Journal R.H.S.* vol. xxii. Part 3, 1899.

A full and excellent description of the genesis of the modern autumnal Strawberry.

1900. *Culture du Fraisier.* By Gustave Faliès.

A study largely from the commercial standpoint.

1909. *Les Fraisiers Remontants.* By Abbé Touraine.

Treating of the culture of the autumn-fruiting varieties, with a coloured plate of varieties raised by the author.

1915. *Fragaria virginiana* in the evolution of the garden strawberry of North America. *Proc. Soc. for Hort. Sci.* 1915. pp. 125-137. By S. W. Fletcher.

A good account of most of the varieties cultivated in America, and a discussion of their ancestry. Published, of course, after Mr. Bunyard's article was printed. [ED.]

[NOTE.—The figures of strawberries are from *Le Jardin Fruitiier du Muséum.*]

Informal and Wild Gardening

By Norman Taylor



THIS hoped to present in this, and later numbers of the JOURNAL some account of wild and informal gardening. Not much of this has been practised in America and there are so many places that would be improved by plantings of this nature, that there seems a real need for descriptions of the materials and methods.

Of course there are several different types of wild gardens and the suitability of such informal planting for any particular locality must be decided with some care. The present issue will deal with

Woodland Gardens

Many garden sites in our American landscape suffer from the formalities of stiff and regular planning, adapted from regions with a different climate and topography than our own. Much of the country in the northeastern United States was virgin forest in the early days and this forest *motif* serves today as a sound basis for the wild garden. It matters little that great clearings exist now in these once primeval forests, that cities and farms and gardens have cut great gaps in a forest region perhaps unexcelled in the temperate zone. The outstanding fact, at the present time is that these forests supply the foundation upon which to build a wild garden.

It will be objected at once that other types of wild gardens, such as rock or seaside or meadow gardens have nothing to do with this forest covering. While this is true, all such gardens *do* have a great deal to do with the natural conditions that have



NATURALIZING DAFFODILS AND TULIPS
CRAGSTON, HIGHLAND FALLS
MRS. J. P. MORGAN

given them their names. In other words these apparent exceptions merely prove the rule that wild gardens must first of all show fitness to their environment. For it is fitness to its environment that measures the success, artistically and horticulturally, of all wild gardens.

Because so much of our area was forest and because that type of landscape is still the dominant one, it is to the forest that we must turn for our ideas in the making of woodland gardens. And to the discerning the forest will be no meagre storehouse, for in it is to be found not only the design but a profusion of materials for carrying it out. Any forest area may suggest dozens of schemes for developing a wild garden. It will certainly and most delightfully unfold to its devotees a constantly changing panorama of flowers, silently coming to bloom and as silently making way for their followers. The usual type of forest will supply us, then, both with the *design* and the *materials* for our woodland garden.

Design for the Woodland Garden

There can be no very precise directions for making wild gardens. Their construction is so much a matter of the utilization of the materials at hand, so largely dependent on local conditions that any suggestions, beyond very general ones must be more or less confusing. The things that should be considered so far as design for the garden is concerned, are: (1) shade, (2) slope, (3) soil conditions.

A consideration of these in detail will show that upon one or more of these conditions, or upon their combination, will depend whatever in the nature of design is to be attained.

1. *Shade*. Perhaps this is more fundamental than any other one thing in deciding to have or not to have a woodland garden. If the area is well forested then there is little to be done except plan informal trails that may suggest themselves to anyone wandering casually through the woods. In such cases there is not so much the making of a plan as the utilization of a site with the least possible disturbance of the natural conditions.

It is the natural condition of shade and the age-long decomposition of leaves without interference that make the forest floor so valuable to the wild gardener. Nothing that destroys this shade, nothing that involves much grading can be attempted with safety. Even the trails had better be curved, not so much for effect, as to break up the wind-sweep that a tunnel-like cut through the forest will create. These trails, too, must never be paved or covered with gravel. The capacity of any gravel walk to dry out the lower strata of air in any garden is great, in a wild garden it may be fatal. Ashes and earth mixed or better yet the natural earth, make the best paths, both horticulturally and esthetically.

Very little virgin forest is now left to us, so that it is nearly certain that the woodland garden will have to be planned through a second or third growth woods. In all such there has come up a great growth of shrubs and thicket-vegetation that will be troublesome to the woodland gardener. Perhaps the best way to overcome such troubles will be to leave between the trails large masses of such thickets, and to cut them out along the edges of the trail. The effect of this will be to provide irregular beds disappearing in the thickets behind, in which to grow the plants. If the trails have been properly planned, so as to pass close to certain large trees, a great boulder, or along side a stream for instance, then the cutting out of the thicket growth in patches will provide little embayments in the forest. Such places framed by the shrubs and trees back of them, quite out of the wind, make splendid places for the naturalization of woodland plants in masses. By this procedure we have provided such a setting for our plants that they will be thoroughly at home.

The effect of these miniature openings in the undergrowth, each with a group of plants that could not be grown in open garden beds, will be delightful. And this not only for the beauty of the woodland flowers themselves, but principally for the fitness of the site for growing just the sort of plants found in such places in the natural woods. There is here no question of imitation of nature, for if the thing is skillfully done it is



CLINTONIA
CLINTONIA BOREALIS



WILD AZALEA
AZALEA NUDIFLORA

practically nature itself. All that is done by clearing out the undergrowth is to bring the forest floor back to the state of most primeval forests where the bushy undergrowth is not apt to become a mere thicket as it is in so much of our second-growth woods. A winding trail, with branches to a nearby spring, to a boulder, or perhaps to a great forest monarch, lined with patches of rare wild flowers, what picture could delight the mind's eye of the woodland gardener more than this? Yet it is not only feasible but in many cases the best sort of gardening that one can do. If there are woods and the usual American landscape, such a scheme has everything to commend it. The artistic advantages of using the materials at hand, of pitching your garden in the key of the surrounding landscape, must appeal to those who rebel against projecting purely formal and often inharmonious designs upon American gardens.

2. *Slope.* This will in some cases decide what type of woodland garden you can develop. If the grade is very steep everything that will prevent washing out of the humus must be done. Rocks, trails, beds, anything that will hold the soil in place must be utilized, perhaps also, some ground-covering plants used in certain parts of it. Even stepping stones or steps, in such places, had better not be directly up and down, as in the spring thaw they may become little more than gullies that drain off that most valuable asset to the wild garden,—the humus.

3. *Soil Conditions.* For woodland plants it is nearly axiomatic that we need woodland soil. This is made up largely of decomposed vegetation and in many cases it is somewhat acid, often too acid to grow vegetables in without liming. But more important still it is the home of microscopic organisms upon which many of the most beautiful wild flowers depend for getting their food. It is not yet fully understood just what the relationship of these organisms to the roots of certain woodland plants really means. Mr. F. V. Coville has demonstrated that only in acid soils can be grown certain plants of the heath

family, and in such acid soils these organisms are known to grow.

If the site of our proposed wild garden does not have natural woodland soil, deep and rich and black, though light and well drained, then the work of making our garden, or even the type of garden, may have to be studied in considerable detail. If the other conditions described under shade and slope are fairly satisfactory the soil can be made for the special beds, leaving other parts with the natural soil. In making soil for woodland plants it is absolutely necessary to get rich leaf-mold or commercial humus and sand. These should be mixed in varying proportions for different species and put in the beds which should have been excavated at least eighteen inches and lined with ashes or other drainage material. In such beds, with an annual layer of leaves, preferably oak, allowed to decompose into the soil, most of our woodland plants can be grown.

There are, then, these three things that will determine the design or feasibility of the wild garden, shade, slope and soil conditions and the first is much the most important. If the shade is there then it is not difficult to begin work, keeping always in mind that the woods are chiefly a setting for the garden, not something into which all sorts of things can be introduced. Anything that destroys the forest calm, the quiet nook, the stillness and essential seclusion, these things are to be shunned not only on esthetic grounds, but mostly because all such mishaps mean destruction of conditions, almost impalpable yet very real, that are the breath of life to our woodland plants. Undisturbed soil conditions, shelter from burning sunlight and drying winds, these are found in woodland gardens that have been tampered with very sparingly and rather skillfully and only sufficiently to make space for the plants we wish to grow. Buildings or structures of any sort can be used in the design only very sparingly. Log cabins or rustic seats may sometimes be effective but on the whole it would seem better to leave the woods as completely unspoiled as possible.

Materials for the Wild Garden

Plants for the woodland garden are legion. There are good arguments for using only native American species, they "fit" the landscape better and have not that exotic look that intrudes in some collections. Practically all the species mentioned below are native to the northeastern United States and all can be grown from Virginia to the Mississippi and northward into southern Canada.

The culture of woodland plants presents difficulties to those who do not know their natural habitats and wild range. Certain of them are naturally mountain species, others common only along the coastal plain. Some are partial to certain types of soil, others are apparently almost indifferent. In the discussion of various species below only those most satisfactory and most easily grown have been included, but there are many more that seem to have special fondness for conditions that will elude all but the enthusiast. If one may be permitted to ascribe feeling to certain of them it almost seems as if they resented the attention of experts and theorists. One of the most successful cultivators of woodland plants in this country is a man who practically lives in his garden, feels with it, plays in it and is blissfully ignorant as to mycorrhiza and soil acidity and all the modern talk of soil organisms!

As to propagation, most of the species had better be collected or purchased. All those mentioned below are perennials and their methods of propagation are little known in many cases. Some have seeds that lie for eighteen months or two years before sprouting, others apparently sprout quite readily. Very few can be grown from cuttings, practically none should be propagated by division of the roots as one of the conditions of successful woodland gardening is to let the plants alone. If they are happy they will spread naturally which is just what is wanted, if not, only the most skillful culture will get them established. Indeed it may almost be set down as a rule that no plant that cannot be established in one year should have a place in the woodland garden. For that reason there are no

orchids in the following list, as they are the most difficult of all woodland plants to grow.

List of woodland plants to be grown in deep shade, the soil not cultivated, and plants allowed to spread as they will

TRAILING ARBUTUS (*Epigaea repens*). Hard to grow. Better keep frozen transplanted clumps covered with leaves for the first year. Most fragrant of native plants.

BLOODROOT (*Sanguinaria canadensis*). Prefers deep shade but can be grown in fairly open places. Flowers very early in the spring.

MANDRAKE (*Podophyllum peltatum*). Prolific grower and will stand considerable sunlight. Handsome large leaves are showy.

MITREWORT (*Mitella diphylla*). At home on moist shady banks. Useful only in masses, its spike-like flower-clusters very slender. .

FALSE LILY OF THE VALLEY (*Smilacina bifolia*). Better be used in large masses of 100 or more plants. Covers the ground in a few years.

RUE ANEMONE (*Thalictrum anemonoides*). Must be in place thoroughly sheltered from the wind. Flowers white. Plant delicate.

WAKE ROBIN (*Trillium grandiflorum, erectum and sessile*). All can be grown in places not too deep in the woods. Soil should be deep and rich. The showiest is the white *T. grandiflorum*.

TOOTHWORT (*Dentaria diphylla*), Prefers moist places in deep woods. Flowers white, usually plentiful.

FOAM FLOWER (*Tiarella cordifolia*). Its profusion of feathery white flowers make it one of the most effective of the woodland species. Often grows in profusion on springy banks.

DWARF CORNEL (*Cornus canadensis*). Best not to plant near the coast. Flowers look like miniature dogwood. Some moisture essential.



STEPS TO THE ROCK GARDEN
NEW ROCHELLE
MRS. J. D. WOODWARD



FALSE LILY-OF-THE-VALLEY
SMILACINA BIFOLIA

DALIBARDA (*Dalibarda repens*). Blooms after most spring flowering plants are past. Nearly prostrate and at home in most secluded parts of the woods.

DUTCHMAN'S BREECHES (*Dicentra cucullaria*). Keep from winds and too much sun. Likes cool moist shady places. Flowers very delicate and soon withering.

DOG'S-TOOTH VIOLET (*Erythronium americanum*). One of the most beautiful yellow flowers among native perennials. Plant in large masses. Slow to spread.

VIOLET (*Viola rotundifolia*, *pubescens*, *canadensis*, and other species). Many sorts of violets can be grown in rich woods. Naturalized in masses at the base of trees they are most effective.

BELLWORT (*Uvularia grandiflora*). The best of all the wild bellworts. Requires considerable moisture, and cool shade.

CLINTONIA (*Clintonia borealis*). Will stand some open sunshine, but at home in deepest woods. The purplish-blue berries are effective.

TWISTED STALK (*Streptopus roseus*). Rich deep woods are needed for this, and it does well on shady banks.

GAY WINGS (*Polygala paucifolia*). The purple-fringed flowers of this plant, which grows in dense mats, are most beautiful. Needs deep soil and no disturbance.

COLUMBINE (*Aquilegia canadensis*). Grows best where there are rocky shaded ledges. Spreads easily and rapidly.

WILD GINGER (*Asarum canadensis*). Flowers not showy, but the rich green leaves make it one of the best ground covers in shady places. Will cover large areas in a few years.

These few species are among the best for the American woodland garden, but there are hundreds more,* many of which must be collected from the wild. Of course our native ferns and such old favorites as the rock saxifrage and hepatica will

* In an article by the writer in the May, 1915, issue of the *Garden Magazine* there is a long list of Wild Garden plants, and in the *Journal* of the Royal Horticultural Society for April 1915 there is a good account of such gardening in England by James Hudson. Some of the plants mentioned there, however, are not hardy in northeastern United States. 6

surely find a place. In some woodland gardens the forest kinds of goldenrod and aster can be used, but they are apt to become weedy.

Many of the plants for woodland gardens listed by Mr. Hudson, as suitable for England are also useful here. For those who do not object to a foreign note in their wild garden, his list is here quoted, leaving out those species not hardy in America.

Plants for Woodland.—Snowdrops, *Anemone blanda*, *A. ranunculoides*, and varieties of *A. nemorosa*—such as *Robinsoniana*, *Scilla nutans* and *S. n. alba*; Primroses (yellow and white, *not* coloured), *Campanula latifolia* and *C. l. alba*, *Chionodoxa sardensis*, Dog's tooth Violets, white Wood Violets, *Helleborus foetidus*, Wood Sorrel (white and pink), and Ferns in abundance (the wild British are by far the best, and the curious crested and other forms should be used most sparingly, not more than 1 in 25), such as *Lastrea dilatata*, *L. Filix mas*, *Athyrium Filix foemina*, *Polystichum aculeatum*, *angulare*, and *munitum*, *Scolopendrium vulgare*, *Polypodiums vulgare*, *Dryopteris*, and *Phegopteris* (both the latter in rather damp spots), *Osmunda* in wet places.

While it is true there should be no cultivation of the soil in woodland gardens, they cannot be neglected. Weeds will come up in such places and seedlings from trees and shrubs must be kept down or else they will choke out all but the hardiest of our woodland plants. In some gardens where there is a steep slope it will be advisable to water freely. If this is not done the results will not be satisfactory, and the constant aim must be to have the plants do better than they do in nature where they have to meet competition of various kinds.

Perhaps one of the best reasons for having a woodland garden has been left to the last, because to those who love the woods and the flowers in them, it is most important. Woodland gardens properly made and stocked make plant sanctuaries of the most enduring sort, for in them can be preserved many of our most beautiful wild flowers, which from their very beauty are most apt to be exterminated by the thoughtless.

BROOKLYN BOTANIC GARDEN.

*Lawns and Their Upkeep**

By James MacDonald, F.R.H.S.



FROM very early times lawns have been subjects of considerable importance. Our own country has always excelled in their culture, and the heritage left by our fathers deserves from us a continuance of the same care and attention which they gave, so that we may continue the pre-eminence they have bequeathed to us. The old lawns scattered about the country in open places and in crowded cities are no mean legacy.

The old gardeners were proud of their lawns—or greens, as they were familiarly called—and instances are frequently recorded of the careful and skilful manner in which they transformed unsightly places into scenes of pleasure. I may mention a reference in this direction by that fine old writer, Evelyn, to a spot near our Hall. He writes: "One needs to go no further to see the effect of this husbandry than to St. James's Park, where, before the Canale, I remember all that pleasant valley now yielding most rich Pasturage (with the fish Decoy and walks planted with fragrant Lime) was nothing but a noisome, unwholesome Bog or Morass of moss and rushes." The gardeners of the past were clever men, and it is due to their ability that there are such fine old lawns in the country.

But, fascinating though the subject of old lawns and their guardians may be, the modern lawn and its upkeep is the theme which most interests us. The lawns of the past were well adapted for the days of chivalry, and the old "gardens with their broad green walks" are being copied very freely by the modern landscape gardener. With the advent of the lawn mower, a great change occurred in the treatment and condition

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of lawns. The scythe was an implement which required a very considerable amount of skill and concentration of energy, to keep the turf to the required smoothness. With the lawn-mowing machine the work is of a more mechanical nature, and the lawns have suffered accordingly.

The feeble and hoary tale of the Oxford college gardener, who is reputed to have said that lawns required centuries of ungrammatical culture to get them established, has long been exploited. Lawns can be formed in a few years or a few months, according to the skill and energy displayed in the work. One reason why occasional failures occur with lawns is that very little notice is taken of the peculiarities of the soil and situation. If we wish to plant trees or shrubs we generally take care to select varieties suitable for the locality, but with lawns it is sometimes considered that grass is only grass, and very little care is given to the choice of sorts likely to succeed. Not only is this so, but, because grasses will grow anywhere, the preparation of the ground is not always so thorough as it should be.

When it is remembered that the ideal lawn consists of myriads of grass plants, all equally healthy, it will be readily seen that great care is required, to get such a condition of affairs. In making a lawn the local peculiarities have to be carefully considered, and as these vary very greatly it is impossible to give directions that will be alike applicable to all. A practical demonstration in lawn-making is equally out of the question. I will, however, explain how we made lawns at Harpenden this year, and illustrate the work by reference to the figures.

Our illustration shows a general view of the turf nursery. The idea is to grow a bed of each of the most useful varieties of grasses, each divided from the other, by a narrow gravel path, so that they can be kept in every way quite distinct. The two ends are treated so as to get the best results in lawn turf culture, while the centre is allowed to grow on, for the variety to develop itself fully. Two spaces near the centre are treated as meadow land. The photographs were taken a little over three months from the date of sowing.

The space selected was partly orchard and partly arable land, with an irregularly undulating surface. The trees in the orchard were carefully rooted out and burnt, and every particle of rubbish cleared away from the arable land. Levels were then taken, and the whole area bastard trenched, taking care to retain the best soil on the top.

Frequently when this stage has been reached the ground is raked over and the grass seed sown. This method may be expeditious, but it is the cause of many failures. The grasses germinate and grow for a time, but in a few months—except in exceptional cases—the finer grasses die away, and only the coarser and stronger varieties remain. If grass seeds are good they may be sown on a ploughed-up furrow, and they will grow and look well for a time, but they will never make a lawn.

Instead of adopting this rough-and-ready method, the whole of the ground was sifted to a depth of about three or four inches. This may seem to some an elaborate system of preparation, but if a good result is desired no detail of cultivation should be considered too much trouble. Besides, it is the cheapest way in the long run. The ideal lawn must possess a perfectly smooth face, covered with a thick, close growth of grass. To obtain this result the sifting was necessary, and after it was done a sprinkling of chemical manure, consisting of 20 per cent phosphates (mostly soluble), 7 per cent nitrogen, 10 per cent potash, mixed with a local preparation, was sown over the ground, and lightly raked in. Now, if instead of sifting the soil to get an ideal surface before sowing the seed, this important detail of cultivation was left until the seed had been sown, and a smooth surface tried to be got by the agency of a roller, the result could not have been nearly so good. There is only one way of getting a good lawn from seed, and that is the right way. Get the surface perfect before sowing the seed, and the after-process is easy.

In a few weeks, according to the weather conditions, the seeds will germinate and growth should be rapid. Sometimes a spell of dry weather succeeds the sowing and causes anxiety, but if the ground has been thoroughly prepared, and suitable

varieties of grass seed sown, dry weather need cause very little trouble. At such times, if watering is resorted to, the result is almost certain to be anything but pleasing. A dry spell may delay the germination, but that should be all.

Like all other plants, the early days of grasses are times when care and gentle culture are a necessity. As soon as they are sufficiently long and strong to cut, this should be done with a sharp scythe, and the cut grass raked off—not swept, as is frequently the case. In all probability, the mowing will have to be done with a scythe for some time, until the plants have thickened sufficiently for a lawn mower to be used. A common mistake in lawn turf cultivation is to consider that when the grasses have reached this stage they can take care of themselves, if they are groomed occasionally with the roller and mowing machine. They resent such treatment.

At this stage it is most essential to give the grasses suitable nourishment similar to that already recommended, but it must be given very carefully. The advantage of beginning to feed the grasses so early is that the roots are retained on the surface, and a finer, closer growth of grass is developed than if they were allowed to grow on, without this attention. But, in applying the plant food, care must be observed to sprinkle it frequently on favourable occasions, instead of as an annual or bi-annual dressing.

The period in which a lawn, after sowing, may be considered fit for use depends, as has already been mentioned, very much on the treatment it has received. Indifferent preparation of the ground and inadequate attention afterwards can only result in failure. The great defect of seeding by the ordinary method is the length of time before the surface soil is a network of healthy roots, and covered with fine grass, so that it can be walked or played on, without mud being too strongly in evidence. This, by the usual system, will always be a drawback to it being so extensively done as it might be.

For many years we have recognized this disadvantage, and experiment after experiment has been tried to remedy the defect, and at last we succeeded. A fabric is specially prepared,

and sufficient suitable plant food incorporated with it, to sustain young grasses for a considerable period. The seeds are sown on this, and when the plants are well started the fabric is transferred to the ground where it is permanently to remain. There are many advantages attached to this method, some of which I will refer to. Assuming, as is sometimes the case, that a structure has been erected—either a new building or an addition to an existing house—the work may be completed at a time when it is impossible to lay down turf, and inadvisable to sow grass seed. In such a case the prepared fabric can be transferred to the desired place, and give the necessary finish to the work.

Another great advantage of this method over any other is that most weeds cannot grow through the fabric. Anyone who has had experience of a seeded lawn under ordinary conditions knows only too well how troublesome weeds are in the early stages. Being indigenous, they grow with greater vigour than the grasses, and occasion an enormous amount of labour to root them out, at the same time damaging the young grasses very considerably during the process.

Besides these weeds, there are always some native grasses that will grow at the same time as those that were sown, and as these are difficult to discriminate in the early stages they are allowed to grow with the others until their true character is developed, when they have also to be rooted out. Those disadvantages are avoided by this special system, and if a lawn is desired to be exclusively of any one particular kind of grass it can easily be grown under these conditions. One point to be observed when this is desired is that the initial preparation of the ground is such that will suit the particular kind of grass it is intended to grow. For example, the preparation necessary to grow *Festuca rubra* will not answer so well for *Poa pratensis*.

City lawns could be produced more rapidly and more satisfactorily by this method than by the means generally adopted. The great length of time taken by the usual system of seeding in securing a lawn has caused turf in many instances to be introduced from country districts. This is rarely a success,

and the reason is not difficult to find. There are but few grasses that will grow well in towns, and these are seldom introduced with country turf. The kinds introduced vary with the district they are imported from, and it is very rare, outside a city radius, to find turf so exclusively composed of Poas as that found within the city boundaries.

The species of *Poa* which are best suited for such places have been a matter of discussion for many years. My experience favours *Poa trivialis* for the more open spaces, and *Poa pratensis* where there is more shade. Where the shade is exceptionally dense, I have used with great success the perennial dog's-tail (*Cynosurus cristatus*). Close to the stems of large trees I have found this to succeed better than any other grass. *Poa annua* is sometimes recommended, but rarely used, no doubt in some measure owing to the difficulty in obtaining the seed.

This, in my opinion, is a wise provision of nature, for, as its name implies, an annual grass cannot be good for a permanent lawn. *Poa distans* is sometimes confused with *Poa annua*, but, although they are in some respects alike, *Poa distans* is a perennial.

Turfing Lawns

Lawns that are to be turfed over require very much the same initial preparation as that advised for seeded lawns. The ground should be deeply and carefully dug as long before laying down the turf as possible, and the surface hoed over on every favourable occasion. Just before laying the turf, the surface soil ought to be sifted to a fine tilth, and well rammed with iron rammers. When this is done so that the ground presents a perfectly even and firm face, the turfing can be commenced.

Now, there are many ways of doing this but the best method is to cut the turf in squares of a definite size. One foot square is as useful as any that can be suggested. Turf cut like this is easily handled, and is in every respect better than the primitive method of rolling them in lengths of three feet by one foot. However carefully it is cut in such lengths, there are certain to be some irregularities that are detrimental to the accuracy re-

quired for first-class lawns. Some who adopt this system will tell you that these irregularities will roll out to the desired smoothness. But even if this could be done it cannot be considered good workmanship, for if a mound is compressed to the level of a hollow there still exist two distinct conditions that will prevent the even growth of grass, which for the ideal lawn is as necessary as the level state of the ground.

When the turfs are cut into the one-foot squares already mentioned, each turf is trimmed to an even thickness. This is done by laying them grass side down on a shallow tray, the depth of which varies according to the thickness desired. The trays need to be made so that the cut turf can slide in and out, but otherwise to fit the turf so that there is no room for movement. Then, with a sharp two-handled knife, cut the underside to the gauged thickness. If the soil has previously been prepared to a firm evenness, the turfs can very quickly be laid down, fitting them closely to each other and presenting, when finished, an accurately dead evenness that requires only thoughtful cultivation.

This cultivation must necessarily vary somewhat with varying soils and conditions. The first thing to do is to give the newly-laid turf a dressing of chemical manure. and after this has been done apply a light sprinkling of finely-sifted soil or sharp sand. The chemical manure induces root growth, which unites the turf together, and the fine soil or sand fills up any joints that may be open. Occasionally at this stage it is well to sow some grass seed, especially if the turf laid down is inclined to be weakly or thin in texture. Very little rolling, if any, is necessary in the early days of the lawn, and when rolling is done the ground ought to be in a fairly dry condition at the time, and only a light roller used. I know this is opposed to a very general practice which consists of using a heavy roller when the ground is wet, so that it may "leave a good impression behind."

Such an impression, however, is distinctly hurtful to the future lawn. All gardeners are aware that it is necessary for the welfare of a plant that the rooting medium should be of

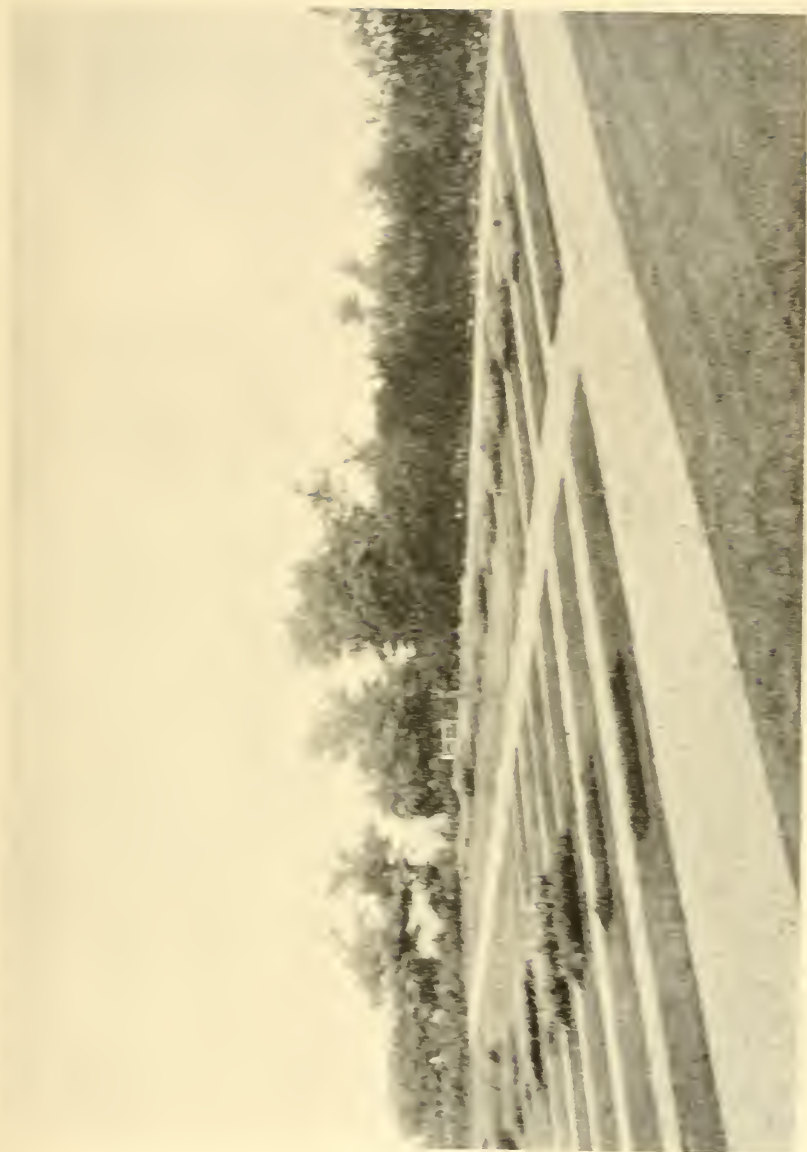
an even firmness throughout. No one would expect a plant to remain healthy, or to grow freely, where the surface is too tightly compressed. After all, grasses are plants, although the treatment they sometimes get is sufficient to make one think that they are not always recognized as such.

Where this extensive rolling is persisted in, it generates conditions under which the finer grasses cannot grow, and eventually coarser kinds, weeds, and bare patches take their places. If a lawn has been well made and suitably attended to, very little rolling should be necessary. These conditions must have given to it an even, smooth surface, which can be easily retained with skilful cultivation.

Deeply as I have gone into the matter, I cannot find out the least excuse for the continuous use of a heavy roller on lawns. The most successful cultivator of lawns is the one who works conjointly with nature, which readily responds to gentle culture, but resents forceful treatment.

These later remarks apply chiefly to what may be termed the ordinary lawn. Lawns that are used for such games as lawn tennis need to be treated rather differently. An ideal tennis court should play fast, and be firm and true. To obtain these essentials a greater amount of rolling is necessary than I have previously advised, but this rolling must be done with caution and discrimination. Rolling, that under certain conditions will do good, at other times may do harm. Winter rolling may be placed under the latter category. At this period of the year, or in early spring, it almost invariably does harm, and should be avoided.

Generally lawn tennis is played from May to October. As soon as the period of play is over, the treatment necessary to prepare the lawn for the succeeding season should be commenced. This may consist of re-turfing any very worn-out places with turf of equal texture to the existing material. Then loosen any very severely compressed places with a digging fork, and heavily rake over the whole area. When this is done apply chemical manure according to requirements. It is important that this chemical dressing should be of a nature that will benefit the turf.



TURF NURSERY
HARTFORD



CROQUET LAWN ABOUT
FOUR MONTHS OLD
HARPENDEN

The nature of the plant food, and the manner of its application, must necessarily vary very considerably, according to the kinds of grasses that exist, and the nature of the soil in which they are growing. Situation also has a considerable influence on the growth of grass. This can be seen on almost any lawn by comparing the growth on a slope with that on the flat. It is these variations that in a great measure make the cultivation of grasses such an interesting study. I admit a certain amount of enthusiasm on the subject, and after many years of close attention to it I find that the greatest aid to successful culture is observation. Even in the application of food, I find observation of far greater assistance than an analysis of the soil alone.

If one is thoroughly conversant with a plant, it almost tells you what treatment it should receive. Take a *Poa* or a *Fescue*, both very important lawn grasses, and examine it. If it is a small contracted specimen, it tells you at once that its emaciated condition is due to a lack of proper food. If it is a soft, loosely-grown plant with abnormally fleshy roots, it is readily seen that the rooting medium is defective. Now the same treatment applied to both alike will not give a satisfactory result. The weakly specimen needs freer rooting conditions, and frequent light applications of suitable plant food until it has recovered its normal vigour. The luscious growing plant requires something that will absorb the excess of organic nourishment existing there, and induce a more fibrous and firmer root growth.

Perhaps I can illustrate this better if we examine an undulating putting green on a golf course. The best putting greens are evenly clothed with close, fine grass, which is equally good on both mounds and hollows. The natural tendency of grassy mounds is to get impoverished and hard, so that the rains cannot penetrate, and eventually plant life gets to a low ebb. In the hollows the reverse is the case, and an over-luxuriant growth results. To equalize these growths, distinct treatment is necessary. Very little can be done in this respect during summer, but as soon as the autumn rains have moistened the

ground very much can be accomplished. The mounds then need to be loosened rather deeply with a digging fork, and light sprinklings of chemical manure applied occasionally, when the ground is moist. This will strengthen the grasses and enable them to go through the drought of summer without damage. The hollows need frequent light sprinklings of sand or sandy loam, until they reach a degree of firmness nearly equal to the mounds.

If the winter management of lawns has been thorough, the summer treatment is simple and easy. The cultivation they have received has trained the grasses to go through the heat of summer and the season of play. If either the drought is excessive or the play severe, they may get sunburnt or fagged, but they quickly recover after rain. There might occur exceptional cases where watering lawns may be necessary, but generally it is better avoided. The beneficial effect derived from rain is not due so much to the rain itself as to the altered climatic conditions and the dissolved air which accompanies it. Water applied to turf during hot weather causes the grasses to retain their greenness at the expense of their energy.

Mowing

Mowing ought to be commenced as early in the season as possible; in fact, it will not require to be stopped at all if the winter is mild. But, assuming that the severity of winter has stopped grass growth, as soon as frost and snow have gone and vegetation reasserts itself mowing should be proceeded with on the first favourable occasion. This is an important detail in lawn-turf cultivation. If, as is frequently done, the grass is allowed to grow so long that it has to be cut with a scythe before the lawn mower can be used, the energies of the grasses are extended in the wrong direction. I have seen lawns allowed to grow until there were loads of luscious grass taken from them, and the surface that remained was not turf at all, but miniature stubble. If this practice is continued for any great length of time, the erstwhile lawn degenerates into a mass of moss, weeds, and undesirable grasses.

A suitably nourished, healthy lawn cannot be mown too frequently. A run over every day with the lawn mower when the weather conditions will allow—without the collecting box being attached—is not too frequent. By adopting this method of culture the lawn is always ready for any purpose that may be desired. Not only this, but by doing so the energies of the grasses are directed into the right channel. The manurial benefits derived from this practice are *nil*, but the equalized growth obtained by it conduces to make the fine, close, compact growth so desirable on a lawn.

Renovating Old Lawns

Sometimes old lawns are ruthlessly dug up because they have got into a bad condition. Before adopting this extreme measure it is well to see closely whether they can be reformed, and unless the turf is too thickly overgrown with weeds I have always found it possible to do so. Where the lawns are very mossy they are generally amenable to cultivation, but this cannot be done by the agency of a garden rake, although it is a practice commonly adopted. It is impossible to rake away the moss without rooting out grasses as well, and however closely the teeth of the rake may be placed, they will not clear away all the moss, and generally that which remains grows away with renewed vigour, so that in a short time the lawn is as bad as or even worse than it was before.

In February last we were called upon to improve a shady lawn. At that time it was practically a mass of moss, quite unsuitable for croquet or tennis, for which purposes it was intended. The conditions existing at that time were favourable for the growth of mass, and unfavourable for the growth of turf. Accordingly the moss was first killed with a chemical preparation and afterwards raked off. Then another chemical dressing was applied, to stimulate grass growth. Later on, during April, suitable grass seed was sown where necessary. After that frequent mowing and light rolling were commenced, and have been continued.

This is only one type of the neglected old lawns. They are many and varied, but at a meeting such as this it is impossible to go into the details necessary for their improvement. But they can be improved, and the work is well worth doing.

Bowling Greens

A great expense is frequently incurred in the construction of Bowling Greens and importations of seaside turf which very frequently degenerates. A far less expensive and equally effective method is to sow a good variety of Fescue on ground that has been carefully prepared and dressed with chemical manure that will retain the roots on the surface. Turf of this description can be obtained in six months from sowing if the weather conditions are favourable. It may be slow at first, but all greens of this nature are in their early stages.

The cultivation of lawn turf is a most fascinating occupation in itself, and if it develops into a study of grasses the work is rendered doubly attractive. Many years ago Professor Martyn wrote: "Grass vulgarly forms one single idea; and a husbandman, when he is looking over his enclosure, does not dream that there are upwards of three hundred species of grass, of which thirty or forty may be present under his eye. These have scarcely had a name besides the general one until within these twenty years, and the few particular names that have been given them are far from having obtained general use; so that we may fairly assert that the knowledge of this most common and useful tribe of plants is yet in its infancy."

Some of these words might be re-written to-day.

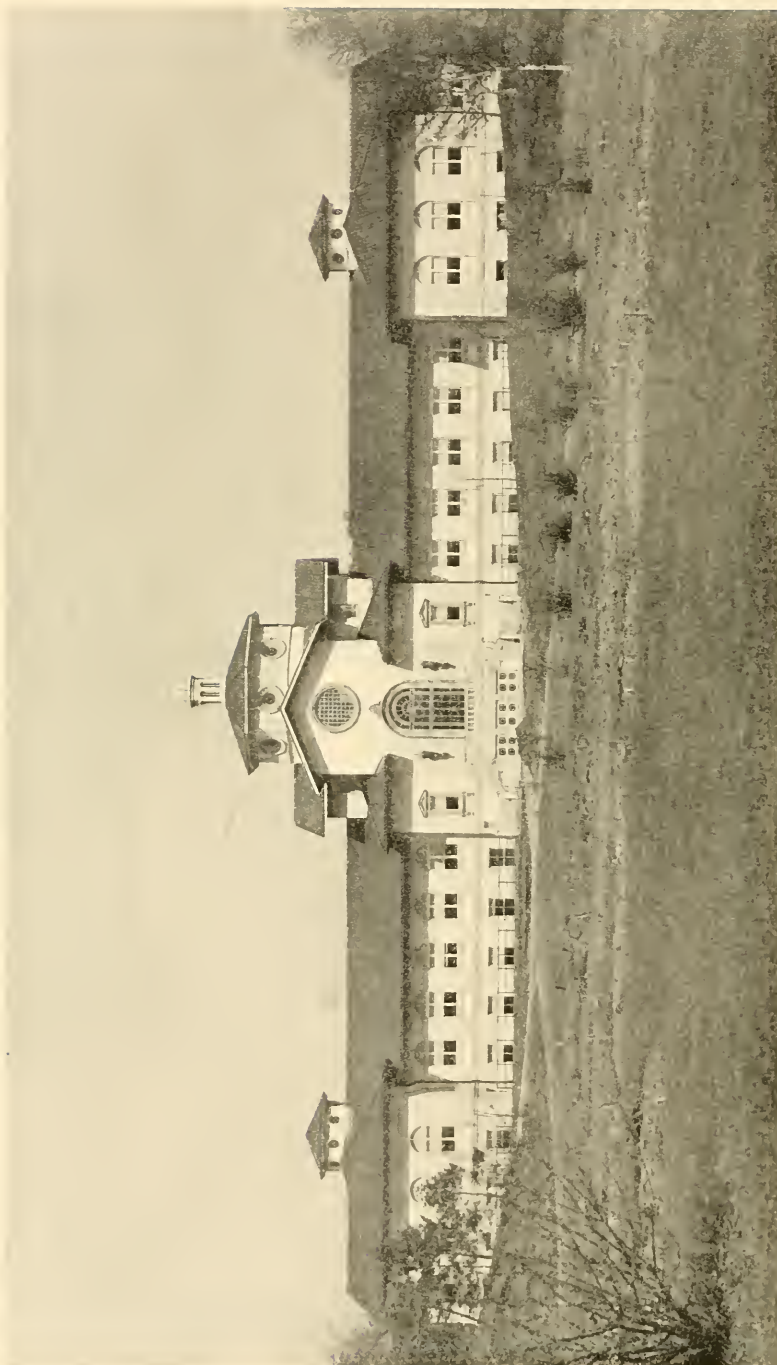
The Brooklyn Botanic Garden

By C. Stuart Gager, Director



FEW American cities have botanic gardens. This is in marked contrast to Europe, where nearly every city of any considerable size has a botanic garden, either as a separate institution or as a department of the local university. In the United States a number of colleges and universities maintain gardens in connection with their botanical departments. Such, for example, is the case at Harvard, the University of Pennsylvania, Smith, Mt. Holyoke, Michigan Agricultural College, and the University of Michigan. With the exception of such gardens, and also excepting the Arnold Arboretum at Jamaica Plain, near Boston, and the Letchworth Park Arboretum along both sides of the Genesee River in New York, both devoted exclusively to trees and shrubs, there are now only three independent botanic gardens in the United States, namely the Missouri Botanical Garden, at St. Louis, the New York Botanical Garden, in Bronx Borough, and the Brooklyn Botanic Garden. Of the last three, the Brooklyn garden is the youngest, having been established in 1910.

Like several other educational institutions in New York City, the Brooklyn Botanic Garden is administered by a private organization (in this case the Brooklyn Institute of Arts and Sciences) coöperating with the city. The city owns the land, has made appropriations of corporate stock for permanent improvements of the grounds and to meet part of the cost of the construction of buildings, and makes an annual appropriation in the tax budget for maintenance. The articulation with the city government is through the department of parks. The private organization has provided a permanent endowment, the income from which is supplemented by membership dues,



BROOKLYN BOTANIC GARDEN
THE LABORATORY BUILDING

special contributions, and, to a very slight extent, by income from tuition and sales.

An institution thus supported is under a double obligation; first to the community, second to science. This obligation is recognized by the Garden in its motto, "*For the advancement of botany and the service of the city*," and the work is organized about these two ideas.

A botanic garden may serve the city by affording additional park space for suitable recreation, and by ministering to the aesthetic sense of the people; it should be beautiful and inviting as well as instructive. But a botanic garden is more than a park, and may render other and more valuable services, especially where there is already ample provision of park space.

The plantations of the Brooklyn Garden are laid out in eight sections as follows:

1. SYSTEMATIC SECTION.

- a. Hardy herbaceous plants, exclusive of local flora.
arranged in beds according to their natural affinities.
- b. Shrubs (*Fruticetum*).
- c. Trees (*Arboretum*).

2. LOCAL FLORA SECTION.

Herbaceous and woody plants growing without cultivation within a radius of 100 miles of New York City.

3. MORPHOLOGICAL SECTION.

- a. External Anatomy.
- b. Comparative Morphology.

4. ECOLOGICAL SECTION,

Illustrating the adjustment of plants to their surroundings.

5. EVOLUTION SECTION.

Illustrating various facts of Variation, Inheritance, Artificial and Natural Selection, Struggle for Existence, Survival of the Fittest, and Plant Breeding.

6. ECONOMIC SECTION.

- a. Foods and Condiments.
- b. Medicinal and Poisonous Plants.
- c. Fiber Plants.

7. WEED SECTION.

Showing the characters of weeds.

8. CONVENTIONAL AND FORMAL SECTIONS.

a. Japanese Garden.

b. Rock Garden.

c. Esplanade.

d. Laboratory and Conservatory plazas.

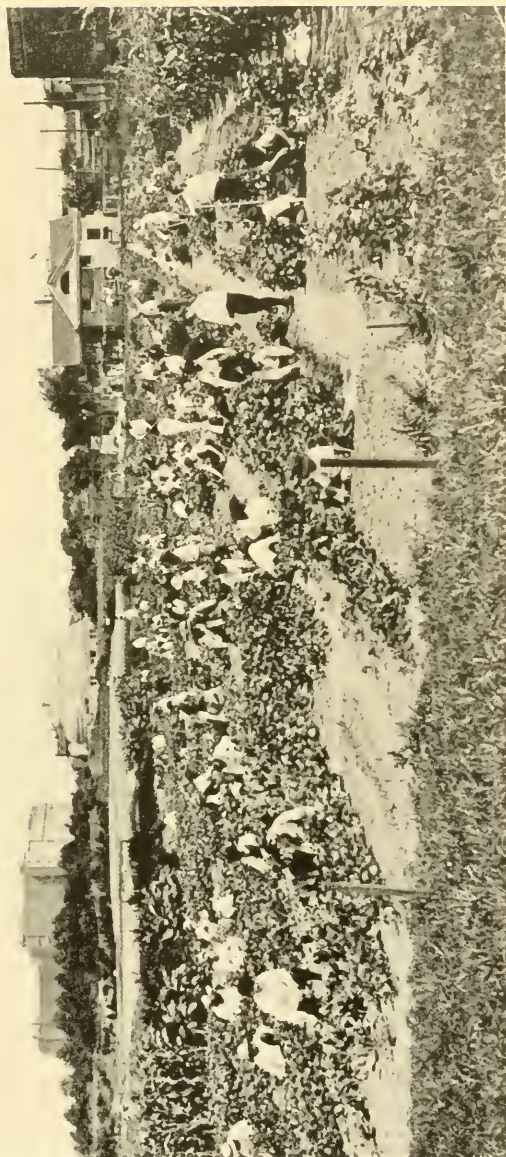
The distinctive feature of the Systematic Section is the plan to combine the fruticetum and the arboretum with the herbaceous garden. The herbaceous plants are arranged by families in beds, and the beds grouped in orders. The beds of each order are surrounded by the shrubs and trees belonging to the same order, and there is a grass aisle 30 feet wide between each two orders. In this way the botanical affinities of the herbaceous and woody plants are emphasized more clearly than is possible by the old arrangement of herbaceous garden, fruticetum, and arboretum as separate plantations.

Much careful study, and the coöperation of the landscape architect were necessary in order to perfect an arrangement like this, which could accomplish what was desired from the botanical point of view, and not do violence to the beauty of appearance. Some concessions had, of course, to be made, but on the whole the arrangement has been worked out very satisfactorily.

The Local Flora Section (or native wild flower garden, as it is popularly called), is one of our most widely appreciated features, especially by plant lovers and devotees of nature study. The plan is not alone to have one or two specimens of each species in beds, but to have large groups of each sort, such as *Trillium*, blood-root, wild ginger, wild geranium, *Cypripedium*, wintergreen, Jack-in-the-pulpit, and others.

To facilitate the growing of bog plants, which tolerate an acid soil, a small bog was brought in barrels from the pine harrens of New Jersey, and placed in a basin prepared for it in the wild flower garden. Here such plants as huckleberry, cranberry, and other bog plants find a congenial habitat.

The Brooklyn Garden has been made the depository of the



IN THE CHILDREN'S GARDEN
BROOKLYN BOTANIC GARDEN

living collection of the American Fern Society, and the Fern Garden was started in the fall of 1916, at the northern end of the wild flower garden.

The violets are planted on a grassy slope with 'space between each species, so as to decrease the liability of mixing the species by the forcible scattering of seeds, which is characteristic of the violets.

The Ecological Section has the brook and swamp on its east side and the rock garden on the west. It is the aim of this section to illustrate the "home life" of plants, and their adjustment to various factors of environment, such as water, light, gravity, soil, insects, and other plants.

There is not space here to speak in detail of all the sections, but special mention should be made of the Japanese garden, for competent critics, both American and Japanese, have assured us that this is the most perfect example of a Japanese garden in any public park in the United States, and probably not surpassed by any in either public or private grounds in its faithful adherence to the principles of Japanese landscape gardening, and in its intrinsic beauty. The large torii like the famous one at Miyajima, Japan, stands in water, and beyond, on the slope of the hill, "heaven," is the Inari shrine. A torii always indicates an approach to a temple or shrine. The shrine is made of California redwood, and is put together entirely without nails, except for the shingles on the roof.

The garden, with its waterfalls, stone lanterns, drum bridge, formed trees, moon-view house, and other characteristic features may best be viewed from the tea house and wistaria arbor across the lake. An annual Japanese tea party, with cherry trees and azaleas in bloom, is enjoyed by the members of the Botanic Garden and their friends. The Japanese garden was a gift to the Botanic Garden, and was not only constructed but has also been partly maintained without expense to the city.

Among several special collections that are planned, only the lilac collection has been started. There are at present over 130 varieties. All plants for the Botanic Garden, not received by exchange or gift, must be purchased by private funds, and op-



ARRIVALS FOR THE ANNUAL CHILDREN'S HORTICULTURAL EXHIBIT
BROOKLYN BOTANIC GARDEN



ONE OF MANY GREENHOUSE CLASSES
BROOKLYN BOTANIC GARDEN

portunity is here afforded for lovers of plants and their fellow men to render a valuable public service by making possible the installation of numerous collections such as that of the lilacs.

The distinguishing feature of the conservatories is the collection of tropical and sub-tropical economic plants. This is not only of great popular interest, but is specially appreciated by teachers of nature study and of geography in the public and private schools of the city. Here the pupils may see growing, and fruiting at the proper season, such plants as banana, orange, lemon, kumquat, citron, tea, coffee, fig, sugar cane, avocado (the so-called "alligator pear"), guava, sisal, Manila hemp, vanilla, cocoanut, chocolate tree, Para rubber plant, and numerous others that could never have been seen except by extensive travel, were it not for such a collection as this.

One can only mention here the herbarium and library, open free daily to the public, and the research work in pure and applied botany for which ample provision has been made in laboratories and private research rooms.

The Botanic Garden *Leaflets*, issued at weekly and bi-weekly intervals from April to October, inclusive, give popular information about plant life, and points to be seen to best advantage in the Botanic Garden near the date of issue. Current numbers of these *Leaflets* are at present sent free to all who wish them. The Garden also publishes a quarterly *Record* (the April number of which contains the annual report of the Garden), a series of scientific *Contributions*, a series of scientific *Memoirs*, and the monthly *American Journal of Botany*, published in co-operation with the Botanical Society of America.

Among the more popular activities of the Garden is the work with children. Numerous courses of instruction are offered throughout the year, including stereopticon lectures, practical work in the plant houses, and children's gardens. The special feature of the work with children, distinguishing it from that more usual in museums and other educational work supplemental to regular school classes, is that it emphasizes courses of instruction, as contrasted with isolated or non-related lectures. There is doubtless something of value in lecturing to

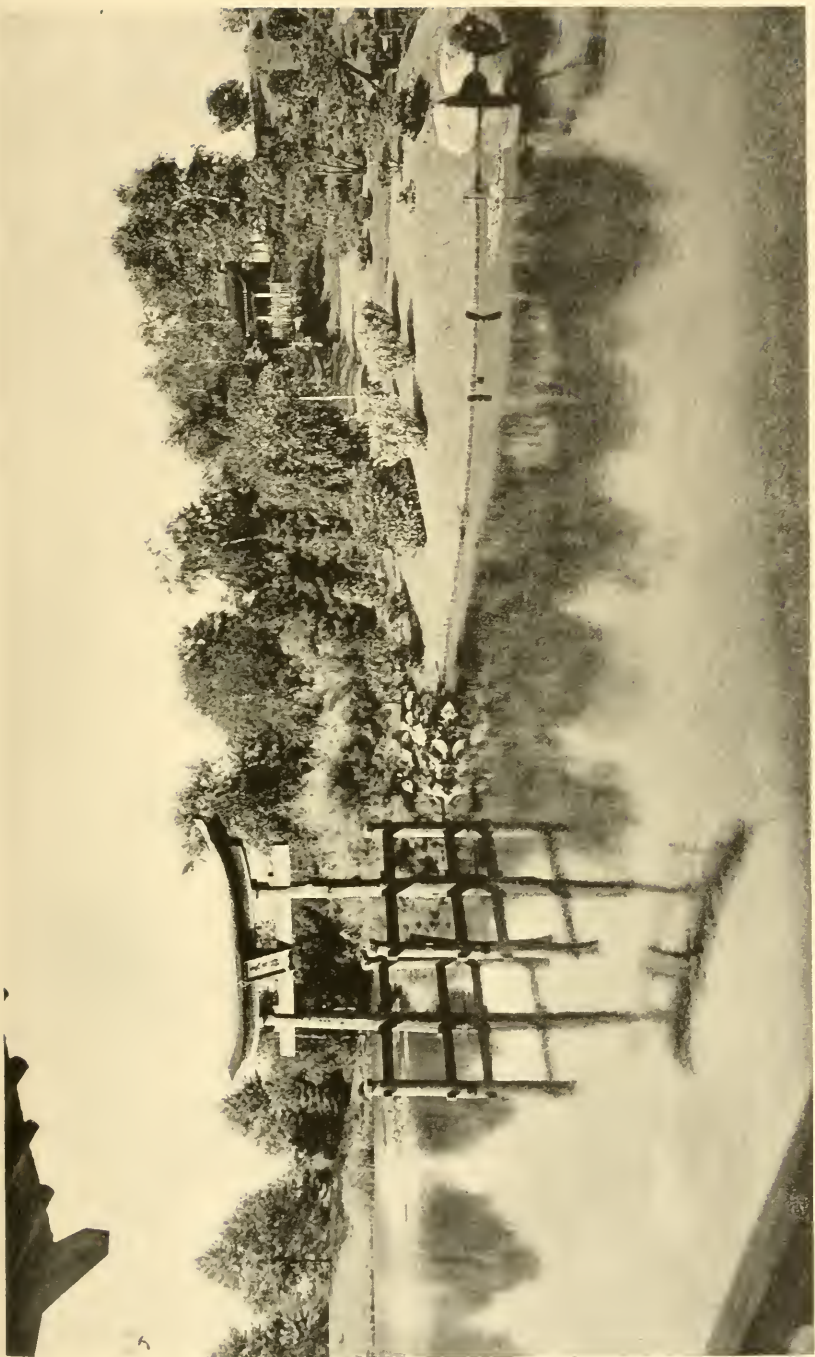
an audience of 800–1500 boys and girls of twelve to sixteen or eighteen years of age, but such a plan, though giving imposing figures of attendance for annual reports and newspaper articles, probably yields the smallest returns of any educational process.

As arranged at the Brooklyn Garden, children meet in small classes of from 25–30, and thus each pupil may receive individual attention from the instructor. Most of the sessions are of the nature of laboratory work—field trips and actual work in the plant house or garden.

The classes are of two kinds; those organized by the Garden, apart from schools, and school classes that come to the Botanic Garden with their teacher. In the latter case some classes come to the Garden the first period in the morning (8.30 or 9.00), going thence to their schools; others come to the Garden for the last period, going thence directly home. The Garden classes proper meet afternoons after school, and on Saturday mornings. The latter work is, of course, all purely voluntary.

Moreover, except for the school classes, every child must pay something, however nominal, for his instruction. For one course, meeting ten times, the charge is only twenty-five cents; but this is amply sufficient to secure the educational advantage which is the chief reason for making a charge. After having tried both plans (charging and not charging) it has been clearly demonstrated that the children are not only much more prompt and regular in their attendance, but are more certain of remaining to the end of the course, have more respect for the work, and show more zest and interest. One boy has walked as far as five miles every Saturday for several weeks, and another boy has taken a round trip journey of three hours on ferry, subway, and trolley every Saturday for more than a year. Boys do not make such efforts to “go to school” voluntarily, and in addition to regular school duties, unless they are intensely interested.

The children have voluntarily organized a Boys' Club (now having over 500 members), and a Girls' Club (having over 400 members). Certificates are awarded on the satisfactory com-



THE JAPANESE GARDEN FROM THE TEA HOUSE, SHOWING
THE TORII AND THE INARI SHRINE
BROOKLYN BOTANIC GARDEN



THE JAPANESE GARDEN
STONE LANTERN, DRUM BRIDGE
MOON VIEW HOUSE
BROOKLYN BOTANIC GARDEN

pletion of a first course, a bronze button for the second course, and a silver button for the working out of a more advanced problem.

In addition to the work at the Garden, children have, for the past four years, been supplied with penny packets of vegetable and flower seeds. The first year 25,000 were called for, this year over 115,800. This means a great many home gardens under cultivation in the city. In the fall a Children's Horticultural Exhibit is held, and prizes are awarded to individuals and to schools.

In addition to the above work, almost the entire time of one member of staff and a portion of the time of three more is required to meet the requests for talks and lectures on nature study, plant life, and gardening at public and private schools, and before mothers' clubs, and various other organizations.

One of the greatest obstacles to satisfactory work in children's gardens has been the lack of adequately trained teachers, and opportunities to secure thorough preparation are not numerous. An interest in children, a mere liking for the work, or even native teaching ability, while highly essential, are not, of themselves, sufficient to insure success. Facing this situation the Botanic Garden organized a course for the preparation of teachers of gardening. The work was planned to extend through the entire year, so that an opportunity would be afforded to get first hand experience in the garden operations of each season. The course includes both theory and practice with sub-courses in soils and agricultural principles, elementary botany, nature study, fungous and insect pests of the garden, pedagogy, genetics, woodwork, plant propagation, and greenhouse work. Each teacher in training must plant a garden and carry it through every operation to the harvesting of a crop, doing herself everything she will be expected to teach her future pupils. Furthermore she must do actual teaching in the garden and greenhouse under the supervision of a critic teacher. Before the final certificate is awarded, each teacher must put in a summer's work with children in the Botanic Garden under supervision.

During the present unusual situation brought about by the war the Garden has provided, free of cost, the services of an expert gardener to inspect vacant lots throughout Brooklyn, and to some extent in adjacent boroughs of Greater New York, to give instruction in gardening to individuals and neighborhood groups, and to supervise vacant lot gardens through the summer until the crop is harvested.

The Garden has also published two *Leaflets*, one on "The small vegetable garden," and one on "Insect Pests." These are distributed free to all who wish them. In addition, the Garden has served as the center of distribution of seed potatoes in Brooklyn for Mayor Mitchel's Food Committee, and nearly 200 bushels have been thus supplied for the planting of vacant lot gardens.

In closing, the writer wishes to urge the desirability of the establishment of botanic gardens in all American cities having a population of from 5,000 to 10,000 or more. This is "another story," and can only be mentioned here, but after the war is over, and men's minds can be turned once more to the occupations of peace, a nation wide movement should be started for the establishment of botanic gardens.

*Some Good Books for an Amateur Gardener's Library**

By E. A. Bowles, M.A., F.L.S.



O RUNS the title chosen by your Secretary when he invited me to give the lecture here to-day. Like all of his work, it shows width of scope combined with useful limitations. For there is scarcely any book on gardening that would not be of some value on an amateur's

bookshelves, even though it were but to show from whence people derive their mistaken notions—as a tutor once said to me when at Cambridge, in warning me against the use of a certain commentary—"Oh yes, I have it on my bookshelf, but I only use it to find out where you all get your mistakes from."

But I am bound to put a check on the list by the first word "some," and to select with judgment that they may be good. Even then it would not be possible in the allotted time to do much more than mention the titles of books good for an amateur with a catholic taste in gardening, so I have thought it better to restrict this afternoon's lecture to passing in short review some of the most useful books on general gardening, endeavouring to point out the characteristics that seem to me to fit them for different requirements demanded by an amateur gardener, and to notice first Encyclopædias and then books by amateurs embodying their own experiences.

For one interested in the flower garden only, Robinson's *English Flower Garden* is absolutely indispensable. It was my

* From a lecture read on November 3, 1914 before the Royal Horticultural Society, London, and reprinted from the *Journal of that Society*.

first love among modern gardening books, and I have helped to turn many another beginner besides myself into a keen and thorough gardener by presenting him with a copy of this book.

I consider it contains more useful knowledge about the plants suitable for gardens than any book of its size, which is saying a good deal when one realizes that it is an octavo volume of over 900 pages. Almost every page contains one or more charmingly artistic illustrations, mostly engraved from photographs.

The book itself has grown as a good garden does, by the addition from year to year of all that was suited to improve it, until now in its latest edition, the 12th, which appeared in 1913, nearly half the book deals with the artistic side of the work, and garden planning from every conceivable point of view, and the alphabetical list of plants completes the volume. To this portion the best experts of the day contributed articles on the families of plants they had specially studied, such contributions generally being marked by their initials. It must surely be too well known and appreciated to need further praise and description.

Nicholson's *Dictionary of Gardening* in four volumes and a supplementary volume, is the next step and has not yet been superseded. If only the contents of the Supplement and the supplementary volume published in 1901 were incorporated with the whole work brought up to date, it would be as perfect as any work could be, in fact what its title-page claims for it, "a practical and scientific Encyclopædia of Horticulture." Its plan is excellent. Each generic name is followed by an explanation of its derivation where known; thus, "*Anomatheca*, from *anomos*, singular, and *theca*, a capsule or seedpod;" "*Apo-cynum*, from *apo*, away, and *kyon*, a dog—adopted by Dioscorides because the plant was supposed to be poisonous to dogs;" "*Bartonia*, in honour of Benjamin S. Barton, M.D., formerly Professor of Botany at Philadelphia." *Arum* is an instance of uncertain origin "formerly *Aron*, probably of Egyptian extraction").

Next is given the natural order according to Bentham and

Hooker's arrangement, followed by a description of the genus and general outlines for the cultivation of its species. Then a list of the introduced species, the Latin name of each being followed by an English translation, so that in this work we have an explanation of every Latin name. A clear and full botanical description of the plant comes next, and then mention of its native country, date of introduction, synonyms if any, any special cultural instructions should the species dealt with require different treatment from that advocated for the genus as a whole; and then, last of all, if it has been figured in any important work, a reference is given to the figure. Vegetables and fruits are dealt with very fully as well as flowers, garden insects, implements, and botanical terms, so that an ignorant amateur gardener should not exist providing he has money to buy and time to study Nicholson's *Dictionary of Gardening*. The illustrations are plentiful and excellent, especially the smaller ones, which are most beautifully drawn and finely engraved on wood, and very superior to the larger ones.

There is a very good Pronouncing Dictionary in the supplement to Vol. IV, and also a wonderfully full list of herbaceous plants for special purposes, another of colours of flowers, and others for flowering periods, heights, bulbs, orchids, palms, bamboos, etc.; of trees and shrubs for special situations, of animals, beneficial or injurious, and of synonyms.

Unfortunately it is out of print, even the supplement, and the price of copies of the last and best edition is rising rapidly.

There is a French edition, translated and adapted for France by Monsieur S. Mottet. Canon Ellacombe uses this edition and declares it to be the best. I do not know whether it is still procurable.

A new edition of *Thompson's Gardeners' Assistant* by W. Watson, whose name alone insures the thoroughness of the work was published in 1902.

It covers the whole ground of gardening, is simple and practical in its statements, much fuller in the accounts of vegetables and fruits than Nicholson, while florists' flowers are treated more fully than the rarer plants. Its place on an amateur's

bookshelf is due to its value in giving him information on matters that some would leave to their head gardener, and it is also very suitable as a present to a head gardener. A new edition, bringing all up to date, is in preparation.

It differs from the two foregoing books in being arranged under subjects, and not as a dictionary. The old editions are still worth consulting, and can be obtained secondhand for about 15s. The current edition, in six parts, costs £2 8s.

The Standard Cyclopedia of Horticulture, by L. H. Bailey (6 vols. 25s. each vol., first two only issued in 1914).^{*} The American point of view predominates in this encyclopædia, but in this new edition the author has been careful to incorporate information from many European sources. Keys to the classification of important genera are given on Engler's plan where available. Each name is accented for pronunciation. Explanations of the most general specific names are given in a list in the first volume. The illustrations are poor, none too well drawn, and the blocks are worn out, but for those who cannot obtain a copy of Nicholson, and can afford to wait for and pay for this work, it may be classed as an indispensable.

A Practical Guide to Garden Plants, by J. Weathers, brings together the commonest garden plants in one volume. It is arranged in families, not alphabetically, and may be described as a compressed Nicholson in selected form, suitable for the uninitiated amateur of smaller ambitions. It is both handy and inexpensive, costing a guinea, and deals with vegetables and fruit, but not the greenhouse.

Johnson's *Gardeners' Dictionary* is an old favourite, the first edition having appeared in 1846. It possesses no literary charm, but is very concise. There is a new edition, published in 1894, and edited by C. H. Wright and D. Dewar, that costs 9s. Loudon's *Encyclopædia of Plants* claims to comprise "the specific character, description, culture, history, application in the arts, and every other desirable particular respecting all the plants indigenous to, cultivated in, or introduced into Britain."

^{*}The final volume of this work, the standard in this country, was issued 28 March, 1917. For American gardeners it is the most complete reference book yet published.—ED.

This is no small boast, but one faithfully fulfilled in a very thick 8vo volume of 1574 pages. The principal Cryptogams—that is to say, Mosses, Liverworts, Algæ, Lichens, and Fungi, as well as Ferns—are included, besides flowering plants; and in the edition of 1872, containing the second additional supplement, 21,289 species of plants are fully described.

To do this, even in so thick a volume, it was necessary to compress the information into the smallest possible compass, and the whole book is a model of careful arrangement. The left-hand pages throughout are divided into thirteen columns; by use of abbreviations and signs in many of them the reader can learn at a glance the principal facts known about the plant. To take an example, under genus 1129, *Prunus*, the first column gives species 7056 *armeniaca* L. The second column the English name, *Common Apricot*. The third shows habit and gives a small symbol representing a leafless tree, signifying that it is deciduous. Column 4 shows duration and treatment in the garden generally by combining certain symbols. Here it is blank, which signifies it is hardy, and as the preceding column showed it to be a tree it is unnecessary to state it is perennial by a Δ . 5, popular character, fr. = fruit. 6, height, 15 feet. 7, time of flowering, f. mr. = February, March. 8, colour, of flower; W. = white. 9, native country: Levant. 10, year of introduction of exotics, or localities of British species, 1548 in this case. 11, mode of propagation; L = layers. 12, soil; b. (should be h. = heavy rich clay). 13, reference to a figure; Lam. Ill. t. 431 = Lamarck's *Illustrations de Genres*. On the opposite page is a line of description sufficient for the recognition of the species, in this case "flowers sessile, leaves subcordate;" and below is a figure of two fruits and leaves engraved from drawings made for the work by Sowerby, assisted by Don and the Messrs. Loddiges. It seems needless to praise them for accuracy after mentioning such names, and though so small they are very useful. A note tells us

Prunus armeniaca, Abricot Fr., Abricosenbaum Ger., Albicocco Ital., Albarcoque Portug., is a fruit tree next in esteem to the peach. From its

trivial name it is generally supposed to have originated in Armenia, but Regnier and Sickler assign it a parallel between the Niger and the Atlas, and Dallas states it to be a native of the whole of the Caucasus, the mountains there, to the top, being covered with it. Thunberg describes it as a very large, spreading, branchy tree in Japan. Grossier says that it covers the barren mountains to the west of Pekin, that the Chinese have a great many varieties of the tree double-blossomed, which they plant on little mounts for ornament, and dwarfs in pots for their apartments. It appears from Turner's "Herbl" that the apricot was cultivated here in 1562, and in Hakluyt's *Remembrancer*, 1582, it is affirmed that the apricot was procured out of Italy by Wolfe, a French priest, gardener to Henry VIII. The fruit seems to have been known in Italy in the time of Dioscorides under the name of *Praecocia*, probably, as Regnier supposes, from the Arabic Berkoch; whence the Tuscan Bacoche or Albicocco and the English Apricock; or, as Professor Martyn observes, a tree when first introduced might have been called a *praecox* or early fruit, and gardeners, taking the article *a* for the first syllable of the word, might easily have corrupted it to "apricocks." The orthography seems to have been finally changed to "apricot" about the end of the last century.

There are fifteen or twenty excellent varieties of apricot, besides the peach apricot, a large fruit supposed to be a hybrid between a peach and an apricot. The trees are generally budded on plum stocks, and always trained against walls. Apricots do not force freely.

This portion of the work is arranged on the Linnean System, in which artificial arrangement plants were arranged in groups according to the number of stamens and styles they possess. Although this has been long ago quite superseded by what is termed the Natural System, in which plants are grouped according to the sum of characters in their flowers and fruits, it is very useful when trying to identify a flower that is altogether strange to one. Loudon's *Encyclopædia of Plants*, with its twenty-one thousand descriptions and numerous figures, has often helped me to name a flower when I was utterly puzzled as to its genus, and had but a very poor scrap of material to base my guesses upon; and for this use, and because it is not a costly work to buy, I consider it deserves a place on the bookshelf.

It has appeared in various editions from 1829–1880, and their prices vary from 5s to £1 7s. 6d.

Loudon's *Encyclopædia of Gardening* is another marvel of research and careful arrangement.

Its title-page states that it comprises "the theory and practice of Horticulture, Floriculture, Arboriculture, and Landscape-Gardening, including all the latest improvements," and also that it is "a general history of gardening in all countries."

That strikes one as fairly comprehensive, but a glance at the table of contents causes one to marvel how any one man, even a Loudon, could have collected so much information on such a number of various subjects all connected with gardening. The general index alone amounts to 116 pages, and there are 1351 pages in the main body of the book, and this refers to the first edition of 1822; but there were many subsequent editions, and the last two were described as considerably improved and enlarged. I will select at random a few of the subjects dealt with to give an idea of its versatility. The first chapter deals with the Gardens of Antiquity, and even compares the traditions of the Garden of the Hesperides with the Biblical account of the Garden of Eden, pointing out the parallelism of the apples of Eve and Juno, and of the flaming sword, with the dragon which never slept, which guarded the entrance. In another chapter the gardens of the Romans are very fully described. Even Turkey in Europe, Poland, Portugal, and China are included in a survey of gardening in different countries. The section devoted to the Rise, Progress, and Present State of Gardening in Britain is a mine of information, tracing the succession of various schools of taste, with accounts of the men who created them. Also the progress in the cultivation of plants of ornament and flowers, as seen in books and accounts of old gardens. Norwich seems to have played a great part in fostering the love of flowers, and the Flemish emigrants who settled there in the middle of the sixteenth century cultivated Carnations and Tulips. A florists' feast was held there in 1637. Was this the first flower show in England? Sir William Temple, who flourished a little later, devoted himself to fruit-growing, leaving flowers to the care of the ladies, and only pleased himself with seeing and smelling them. All through the book

pleasant little sidelights on men and gardens are combined with sound instruction. The science of gardening includes the classification, structure and anatomy, nomenclature, functions, diseases, and geography of plants; soils and manures take us into the domain of chemistry and mineralogy.

Then there are chapters on implements, structures, and operations of all kinds, from sowing seeds to the superintendence and arrangement of every kind of garden imaginable.

Horticulture is dealt with in a large group of chapters on the kitchen garden and orchard, and is so marvellously arranged and divided into sections that we can find one devoted to plants used as preserves and pickles; another to edible wild plants neglected or not in cultivation, a very interesting one, in which we learn that "Shoots of Black Bryony and Burdock are good boiled as Asparagus." "Jack-by-the-Hedge, or Sauce-alone, *Sisymbrium Alliaria*, boiled separately and eaten to mutton, forms a desirable potherb." "Spotted Hawkweed, *Hypochaeris maculata*, is good as salad or boiled as greens." But as this plant is so rare and local in England few could find it and indulge in the luxury. Sowthistles' tender tops may also be boiled, and there would be no difficulty in finding this plant in most gardens, I fear.

A section headed "Substitutes for Chinese Teas from wild plants" is proof of the universal information packed away in this book. Edible Fungi and even Seaweeds are dealt with.

An especially interesting chapter contains Statistics of British Gardening—first, of the various conditions of *men* engaged in gardening; secondly, of the kinds of *gardens*, and ends with a list, arranged according to counties, of noteworthy gardens; and the last chapter I will mention is a useful list of authors on gardening, arranged by their native countries as well as chronologically. I bought my copy of the first edition of this book for 2s. 6d., and, though its binding is nothing to boast of, I am well pleased with my bargain and advise all of you to try if you cannot make as good a one. The later editions contain many improvements, notably the one by Mrs. Loudon in 1850, and its reprints up to 1871. These would cost about £1.

Miller's *Gardeners' Dictionary*. Johnson, in *A History of English Gardening*, wrote:

The publication of the seventh edition of that work in 1759 was of the greatest benefit to Horticulture. In it was adopted the classical system of Linnaeus. It gave a final blow to the invidious line of distinction which had existed between the Gardener and the Botanist, and completed the erection of the art of the former into a science, which it had been long customary to esteem as little more than a superior pursuit for a rustic. From being merely practised by servants, it became more extensively the study and delight of many of the most scientific and noble individuals of this country.

I also quote from the preface to the eighth edition, the last published in Miller's lifetime, in 1768:

In the last edition of this work, the author adopted in a great measure the system of Linnaeus . . . , but as many of the plants which were treated of . . . were not to be found in any of Linnaeus's works then published, Tournefort's system was also applied to take in such as were not fully known to Dr. Linnaeus; but since that time, the learned professor having made great additions to his works . . . the author has now applied Linnaeus's method entirely, except in such particulars where, the Doctor not having had an opportunity of seeing the plants growing, they are arranged by him in wrong classes; as for instance the "Ilex . . . and Laureu."

And he goes on to show Linnaeus had not discovered that both of these bore the male and female flowers on separate plants.

Miller's work appeared first in an octavo edition in two volumes in 1724 and much enlarged in folio in 1731, an appendix being added in 1735. The book must have been in constant demand for the best part of a century, as edition after edition was published, the last (9th) newly arranged by Thomas Martyn (1797-1807). The "Figures of the most beautiful, useful, and uncommon plants described in the *Gardeners' Dictionary*" (1760) (300 coloured plates, price now £3 5s.), formed a most valuable addition; they marked an epoch in botanical illustration, some of them being signed by unsurpassed masters like

G. Ehret. Nearly all the editions were pirated by Dublin printers; and further, six abridged editions found a market. The work was also translated into German and French. It is a fine old book, but perhaps more of a luxury than a necessity for the ordinary amateur gardener.

So far I have named only large and important books, Encyclopædias, somewhat costly and useful to those with fairly large gardens, and a desire to be thorough in their work in them. So I will mention a small book, cheerily written, costing only half a crown, but very useful to a beginner with a small garden. It is *A Handy Book of Horticulture*, by F. C. Hayes, Rector of Raheny, in the County Dublin, published in 1901. The author describes his aim in writing it thus:

There is a demand for a simple book on horticulture—a book, for instance, such as a country gentleman who is anxious to encourage his tenants, and to interest them in their cottage garden, could put into their hands to meet such requirements I have endeavoured to compile a Handy-book of Horticulture, which shall be at the same time simple and practical.

I believe he has succeeded as thoroughly as anyone who has attempted the same sort of work, and the book should prove useful not only to those with small gardens and little knowledge, but also to teachers in horticultural classes in schools. There is a rich store of sound knowledge brightly and clearly set out in its pages; for instance,

Under no circumstances should ground be trodden upon or worked when it is in a moist state. Garden plots, where this rule is broken, are generally more fitted for making bricks than for growing vegetables.

After describing the way to prune Red Currants by shortening back the side shoots of the summer's growth to a couple of eyes, he passes on to Black Currants and tells us with these the old wood must be removed, as "Red and White Currants bear chiefly on the old wood, Black on the new." For Gooseberries "keep the centre open like a bowl; cut away the low branches which touch the ground when laden with berries. Cut away

all cross stems, leave as much of the young white wood as possible, and avoid the mistake (into which so many gardeners fall) of treating their Gooseberry bushes as if they were Red Currants." And the treatment of lawns, florists' and border-flowers, potting, hotbeds, cold frames, vegetables, and in fact all branches of work necessary in a small garden are dealt with in an equally concise but sufficient manner.

There remains another class of books on "General Gardening," some of which are absolutely indispensable for an amateur who wishes to make and enjoy a beautiful garden as well as to understand how to cultivate and name his plants. These books have been written by owners of gardens and embody the experiences they have gained among their own plants. In them one looks for the secrets of success in the effective grouping of plants, hints for uses that the lesser known plants can be put to, and especially personal, historical, and literary associations concerning both plants and their introducers. The more the taste and individuality of the writers are interwoven with the information conveyed, the greater is the value of their books.

Of such books the first to appear was Alphonse Karr's *Voyage autour de mon Jardin*, published in 1845. It is discursive, and as full of keen insight into human nature as of plant lore, and much is said of insects, birds, and books, but yet all has a bearing on the garden. The author settled at Nice in 1852, a period when so few flowers were cultivated in the Riviera that cut flowers for a local banquet had to be procured from Genoa. Alphonse Karr, gardener and poet, changed all that; his garden was the cradle of the great cut-flower trade of that region, and he lived long enough to say, "I am the last of the gardeners; they are all horticulturists now." It teems with pleasant "letters" which show his knowledge of the charms of a plant and of the weaknesses of gardeners. This delightful book is not well enough known. An English translation by the Rev. J. G. Wood can be found occasionally in second-hand book lists, priced about three or four shillings.

My Garden, by Alfred Smee, was published in 1872. In a large quarto volume the author described the position, geology,

contents, both vegetable and animal, of his garden at Beddington, in Surrey. For Scientific accuracy at the date of writing, variety of subject, and wealth of illustrations the book is worth a place on a shelf large enough to make room for it without crowding out Miss Jekyll's books which I will mention presently. Compared with Karr's we feel it is rather didactic and too closely related to the text-book in style, although no doubt it would do us all good to read it thoroughly.

The same year saw the publication of Forbes Watson's *Flowers and Gardens*, a small but epoch-making collection of short essays. The first twelve deal with the details of the beauty and the meaning of that beauty, of such well-known flowers as Crocuses, Snowdrops, Primroses, Cowslips, and Daffodils, though occasionally his ideas appear rather fanciful and unconvincing, as in his explanation of the charm of Daffodil leaves consisting in its "suggestion of water, the source and type of coolness and freshness," and that the superficial appearance of the Cowslip is strongly suggestive of sheep. Yet there are so many sentences that show us in a flash beauties hitherto unnoticed that all should possess and read again and again this charming book. Thus, writing of the white, waxy, hardened tip of Snowdrop and Daffodil leaves, he points out first how it fits them for piercing the ground and then writes:

And how wonderfully it adds to the beauty of these plants! Every artist knows what a striking effect can be given by a few well-placed dots to a broken line. And just so it is here. Their sparkling, dotty appearance makes the Snowdrop clusters look interesting and animated from the first moment that their tips pierce the ground, and in every later stage the leaves of both Snowdrop and Daffodil would seem tame and meaningless without it It emphasizes just that point which should catch the eye at once, guiding it straight to the outlines or leading lines, and rescuing the whole plant from what might otherwise appear but a confused patch of green.

Henry Bright has written of Dr. Watson: "No modern author, not even excepting Ruskin, has studied the form and the beauty of flowers so closely and lovingly."

As an instance of this I may quote the following:

One of the most beautiful points in the *Primrose* is the manner in which the paleness of the flowers is taken up by the herbage. Thus look at that down upon the flower-stalks, which clothes them like a soft thin halo, and seems, when you nearly examine it, to resemble the white silky fibres of that lovely mildew which so often forms on things decaying in close places, a something so delicate and half-transparent you think it might melt at a touch.

The second half of the book contains two chapters, one on *Faults in Gardening*, the other on *Gardeners' Flowers*, and Canon Ellacombe has declared in his preface to the second edition that this portion of the book "was the most powerful ally that natural gardening had at that time, and the one that gave the most important help in the destruction of the tyranny of bedding-out gardening. If it did not give the actual death-blow, it certainly gave the first of the death-blows, and the one that had most effect."

This Dr. Watson did by showing how the beauty of individual flowers was lost by making it only part of a mass of colour. He wrote:

Our flower-beds are mere masses of colour instead of an assemblage of living beings: the plant is never old, never young; it degenerates from a plant into a coloured ornament.

He expresses his dislike for double flowers with great force, but quite justly to my thinking. Of the *Hollyhock* he writes:

Look for instance, at the blossoming of a well-grown single *Hollyhock* with its central column of white mealy stamens, around which the bees are for ever digging and burrowing, and observe how beautifully this column completes the deep bowl-like corolla, and then stand apart and see how by these columns the whole spire is illuminated, every part of it brought out into clear relief as by a lamp placed in the centre of each flower. . . .

Now would you think it possible that anyone would be willing to throw away these beautiful stamens and have the corolla choked up by a blind, unmeaning mass of spongy petal?

And of the double *Snowdrop*:—

All the characteristic beauty of the *Snowdrop*, the delicate curvatures of the petals, the contrast betwixt the light, thin, flexible outer petals and

the inner, short, stout, unyielding cup, have disappeared, in order that that light graceful form may be stuffed out as you would stuff a pillow-case with a bunch of strips arranged like a pen-wiper.

Thus he fearlessly revealed his love for natural rather than artificial beauty, and greatly influenced those who read the book, and I cannot help thinking it would be well if the present generation of gardeners were more familiar with Forbes Watson's opinions.

A Year in a Lancashire Garden, by Henry Bright, 1879, and *The English Flower Garden*, 1881, by the same author, are two small books written in a fresh and chatty style, and full of useful hints and a true love of flowers. Both contain passages that carry on the war against the bedding-out system with much vigour. For example:

In the old walled garden, instead of the plants which so long had had their home there, each of which knew its season and claimed welcome as an old friend, there were bare beds till June, and then, when the summer was hottest, a glare of the hottest, brightest colours.

Mrs. Earle has praised the earlier book so highly in her delightful *Pot-pourri from a Surrey Garden* that I feel I ought to like it better than I do, but must confess to preferring the second, though it is more general in scope.

In a Gloucestershire Garden, by Canon Ellacombe, published in 1895, contains a series of papers on gardening, which he contributed to *The Guardian* during the years 1890 to 1893. I owe so much of my enjoyment of gardens and plants to alternating perusals of this book and visits to the author and the wonderful garden he has described in it, that I find it as hard to express my admiration of it as one would to describe the graces and virtues of one's nearest relations.

The author's wonderfully wide knowledge of men and books, his own and other countries, enabled him to take a many-sided view of the plants of which he writes, and I think the chief charm and value of the book arise from the fresh light such a knowledge throws on even well-known plants. You are sure to find on every page some allusion that shows you the

author has seen and read and remembered more than most men have, and the effect of this on the reader is to make him long to see for himself place and book and plant, that he too may experience the same delight in them as they have so evidently afforded to the author. For I know of no other gardening book that is so stimulating and so full of encouragement; that points out so clearly that, to the patient planter and careful student, there will be interest and beauty in his garden from January 1 to December 31, if only he will look for it and work for it.

I will try to illustrate this with a quotation or two.

It is very pleasant to be able to show growing together the Antarctic bramble,* with its curious skeleton leaves and white thorns, and the Iceland Poppy from the Arctic Circle, which is reported to be the most northern flowering plant known—so extremely northern that I was told by one of the officers in the North Pole Expedition that if there was land there he should expect to find the Iceland Poppy.

Do you not at once feel a new interest in these and wish to plant them side by side?

Of the Hardy Palm, *Trachycarpus excelsus*, he writes:

The cultivation of the Hardy Palms is perfectly easy. The Arabs say that they require to have their feet in cold water and their head in a furnace. This combination we cannot give them, nor is it necessary; they only require to be planted in good soil, to be protected from wind and not disturbed, and they will give a continual delight to the grower.†

This I have proved, for, stirred up by this passage, and by admiration of the two very tall Palms at Bitton, I asked Canon Ellacombe, when he was staying with my parents, twenty years ago, to select a site in our garden for a Palm, and no plant gives me more continual pleasure than the fine fifteen-foot-high specimen that now stands there.

From this book I learnt to watch its leaves on snowy days, for he writes:

* *Rubus cissoides* var. *pauperatus*.

† This plant is hardy in America only in the frostless regions.—Ed.

From the times of the Greeks and Romans, the Palm has been the accepted symbol of victory; and the reason given was that however much the palm-leaves are laden with heavy weights they do not break, and are with difficulty bent, and if bent at all they soon rise up again. I have seen this prettily illustrated in severe winters, when the heavy snows have bent the tough leaves of the *Phormium tenax*, so that they could not rise again, . . . and Cedar branches were broken, the broad leaves of the Palm carried the heavy load of snow, and immediately the snow was removed the leaves sprang up and the plants were quite uninjured. The old emblem writers made good use of this character; and Mary, Queen of Scots, took for her device a Palm bending under a heavy weight.

Do you know that "in a slight hoar-frost no hoar-frost is found on the plantains?" Canon Ellacombe has noticed it on his lawn, and tells us it is because the broad leaves lying flat on the ground keep in the earth's heat. Have you noticed that

Plants seem to know (if I may say so) when they are going to die, and then to be able to put forth more vigorous means for their reproduction?

The Canon tells us:

For many years I have grown a pretty little Sea Lavender (*Statice cosyrensis*) from Cosyra, a small island between Italy and Africa, now called Pantellaria. Though a free bloomer, I never knew it to produce a seedling or to form seed. Last year it showed signs of decay from old age, and it entirely disappeared in the winter, but this spring I found a flourishing young seedling about a foot from the parent plant, and since that . . . two or three more.

The reviewer of the second edition in the *St. James's Gazette* described it as "a rare combination of erudition and observation," and concluded by saying, "The result of reading the book is to fill one with a longing to take Orders and study gardening if possible as Mr. Ellacombe's curate."

Besides this book, his *Plant Lore and Garden Craft of Shakespeare* and *In My Vicarage Garden and Elsewhere* have charmed many readers.

But Canon Ellacombe also carried with him an immense personal influence in instilling the love of the flower and the garden. Fond of books, he was one of the first to remind us

what a treasury of gardening literature the seventeenth and eighteenth centuries had produced, and we feel, with him, that there is, on the close of the day, no more beautiful walk than that from the sunlit garden into the sombre shadows of the library.

But the books that make one determined to undertake garden alterations, to re-group one's plants, and attend more carefully to their good cultivation, are a certain three of the many delightful volumes written by Miss Jekyll. Her first book, *Wood and Garden*, set many gardeners on a new road, teaching them what may be done in gardening for beautiful effect.

As with all books chronicling the work and results of one garden, readers must be careful to translate all statements into terms of their own soil and climate.

Few can make their garden in the clearings of such a beautiful Surrey woodland as Miss Jekyll found ready to hand at Munstead, or be able to have green paths of closely mown Ling, but the great value of this account of the growth and success of a very lovely garden lies in the fact that the great majority of plants used in its construction are perfectly hardy and easily obtained and grown.

The second book, *Colour in the Flower Garden*, strikes me as the most valuable guide for making a beautiful garden an amateur can possess. It is the experience of years of successful work, reduced to masterly order—one might say a code of horticultural statutes, a working knowledge of which should be required of every under-gardener as well as gardening amateur to bring about the ideal Utopian conditions of gardening.

If only the garden I tend possessed a soil of greater depth than two inches before it became coarse gravel, and a climate that was a less successful imitation of that of the Sahara in summer and the North Pole in early spring, I should long ago have been converted from my botanical ways, and the collecting and keeping alive of as many plants as possible, to follow Miss Jekyll's methods.

This paragraph on p. vi of the introduction makes my horticultural conscience quite uneasy every time I read it.

I am strongly of opinion that the possession of a quantity of plants, however good the plants may be themselves and however ample their number, does not make a garden; it only makes a *collection*. Having got the plants, the great thing is to use them with careful selection and definite intention. Merely having them planted unassorted in garden spaces, is only like having a box of paints from the best colourman, or, to go one step further, it is like having portions of those paints set out upon a palette. This does not constitute a picture; and it seems to me that the duty we owe to our gardens and to our own bettering in our gardens is to use the plants that they shall form beautiful pictures.

The photographic illustrations and the planting plans in this book are of the highest perfection and value.

Gardens for Small Country Houses, by Gertrude Jekyll and Lawrence Weaver, is a wonderfully complete guide to the planning of most kinds of gardens. The illustrations and plans make one long to possess a small house in each of the southern counties of England, that one might own a garden planned on the lines of each style described in the book. Everything advised is so thoroughly good that I fear most of the plans would entail a good deal of expense to carry out. Let us hope a period of universal prosperity may soon follow this troublous one, and every small house may possess a garden as beautifully planned as those in this book.

The International Flower Show at Grand Central Palace, New York City, in 1916



THE most successful flower show, both in attendance and worth of exhibits, ever held in New York was staged in Grand Central Palace April 5-12, 1916. To thousands of people it was a revelation of what a great indoor flower show can be. It was the third show to be given by the Horticultural Society of New York in coöperation with the New York Florists Club, and to Mr. Arthur Herrington, who was responsible for the arrangement of the show, every credit is due.

Among the more notable exhibits was the Rose Garden exhibited by F. R. Pierson Company which won the first prize in this class and was also awarded the Silver Cup of the International Garden Club for the best exhibit. An illustration of this is reproduced on page 156.

Mr. Adolph Lewisohn won the first prize for a beautifully arranged group of flowering plants and bulbs, which was to many who attended the most artistically conceived exhibit of the show. This group covered 300 square feet and there were several other competitors whose exhibits were nearly as fine, so that this department of the show was perhaps the finest of any of the others.

There were several rock-gardens, usually with a variety of plants, and in this class the Cromwell Garden took first prize, several other firms coming very close to the winner in these attractive displays. Some of the rock-gardens were elaborately planned, built up very high for a temporary exhibit, and richly

planted. With water trickling over some of the rocks for moisture-loving plants, tiny winding paths and moss covered steps, these miniature rock-gardens proved very popular.

There were thousands of specimen plants entered in the different classes of exhibits and everything that the horticulturists of the metropolitan area could bring to perfection was shown under the most favorable circumstances. There was also the usual array of more practical things, garden equipment, implements and greenhouse accessories.

As the report of the Horticultural Society very truly says, "The Red Cross Tea Garden, as last year, was the leading feature of the exhibition. It was conducted on a much larger scale and the funds derived for the benefit of this and its affiliations were much larger." The Tea Garden was designed by Mr. Lawrence G. White and Mr. Frederick R. King to whom were awarded gold medals.

The 1916 show proved the most successful, in every way, of any held up to that time.



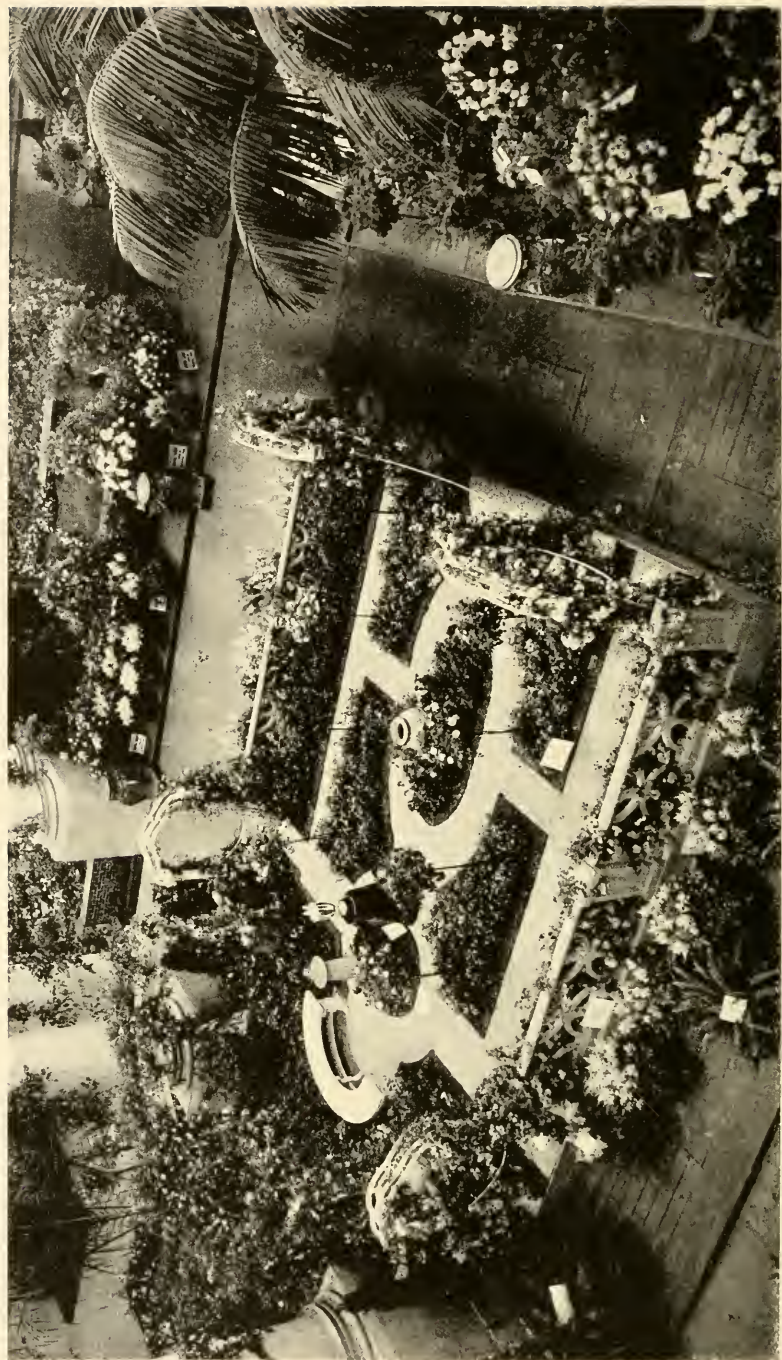
YELLOW TULIPS
MRS. HARRY PAYNE WHITNEY
INTERNATIONAL FLOWER SHOW, 1916



HOWARD GOULD'S
AMARYLLIS
INTERNATIONAL FLOWER SHOW, 1916



HYACINTHS, FIRST PRIZE
C. K. G. BILINGS, ESQ.
INTERNATIONAL FLOWER SHOW, 1916



ROSE GARDEN, FIRST PRIZE AND SILVER CUP,
PRESENTED BY THE INTERNATIONAL GARDEN CLUB
F. R. PIERSON CO.
INTERNATIONAL FLOWER SHOW, 1916



ROCK GARDEN
BOBBINK AND ATKINS
INTERNATIONAL FLOWER SHOW, 1916



KILLARNEY QUEEN ROSE
J. R. PIERSON CO.
INTERNATIONAL FLOWER SHOW, 1916

The June Flower Show at Bartow in 1916



EARLY in the spring of 1916 the President of the International Garden Club called a meeting to consider ways and means of holding an outdoor flower show in June. A preliminary announcement had been issued stating the general plan of the show and listing the following societies and growers as already willing to coöperate in the scheme:

THE AMERICAN ROSE SOCIETY
AMERICAN CARNATION SOCIETY
THE AMERICAN SWEET PEA SOCIETY
AMERICAN GLADIOLUS SOCIETY
NATIONAL ASSOCIATION OF GARDENERS
AMERICAN DAHLIA SOCIETY
CHRYSANTHEMUM SOCIETY OF AMERICA
TARRYTOWN HORTICULTURAL SOCIETY
A. N. PIERSON, Cromwell Gardens
LOUIS DUPUY
AMERICAN PEONY SOCIETY
ELBERON HORTICULTURAL SOCIETY
TUXEDO HORTICULTURAL SOCIETY
WOMAN'S NATIONAL AGRICULTURAL AND
HORTICULTURAL ASSOCIATION
THEODORE HAVERMEYER, representing the
American Gladiolus Society
NEW YORK FLORISTS' CLUB

NEW YORK BOTANICAL GARDEN
BERNARDSVILLE HORTICULTURAL AND AG-
RICULTURAL SOCIETY
WILLIAM MANDA, representing American
Breeders' Association
ASSOCIATION OF AMERICAN NURSERYMEN
BERKSHIRE COUNTY GARDENERS' AND
FLORISTS' CLUB
CANADIAN HORTICULTURAL SOCIETY
HORTICULTURAL CLUB OF BOSTON
LENOX HORTICULTURAL SOCIETY
MASSACHUSETTS HORTICULTURAL SOCIETY
MINNESOTA HORTICULTURAL SOCIETY
NEW JERSEY FLORICULTURAL SOCIETY
NEW LONDON COUNTY FLORICULTURAL
SOCIETY
B. HAMMOND TRACY, Wenham, Mass.
HENRY DREER, Philadelphia

Committees were appointed to cover various phases of the work of preparing the exhibits, and to their helpful coöperation much of the success of the show was due.

Prizes were offered to successful exhibitors, totalling over twenty-five hundred dollars. The schedule for competitors was prepared by a schedule committee, who by their care and experience helped to make the show attractive to both commer-

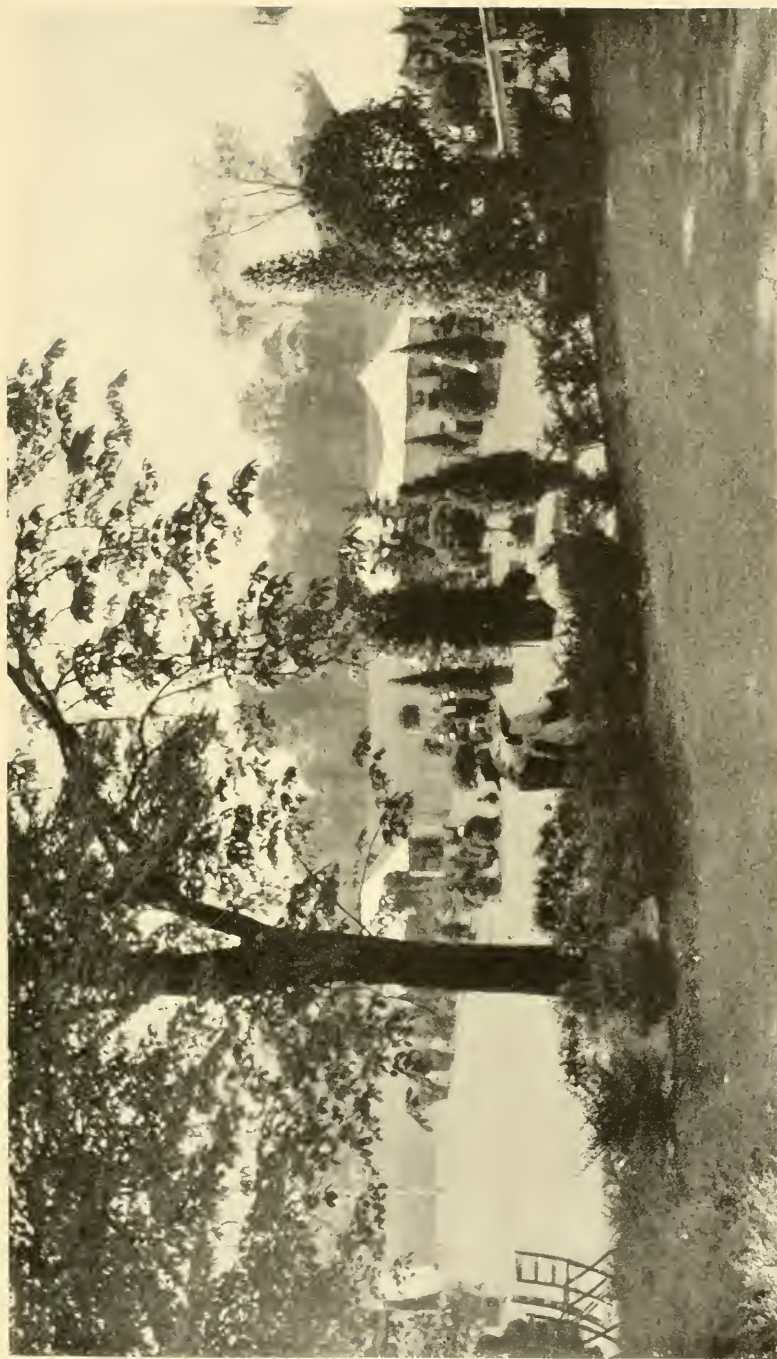
cial and private growers. Those serving on the schedule committee, and to whom the Club here gratefully acknowledges its obligation, were:

F. L. ATKINS	JOHN E. LAGER
LEONARD BARRON	W. A. MANDA
HARRY A. BUNYARD	F. R. PIERSON
JOHN CANNING	WALLACE PIERSON
J. HARRISON DICK	P. W. POPP
W. H. DUCKHAM	JULIUS ROEHRS
M. C. EBEL	GEORGE M. STUMPP
BENJAMIN HAMMOND	CHAS. H. TOTTY
J. S. HENDRICKSON	DAVID WARD

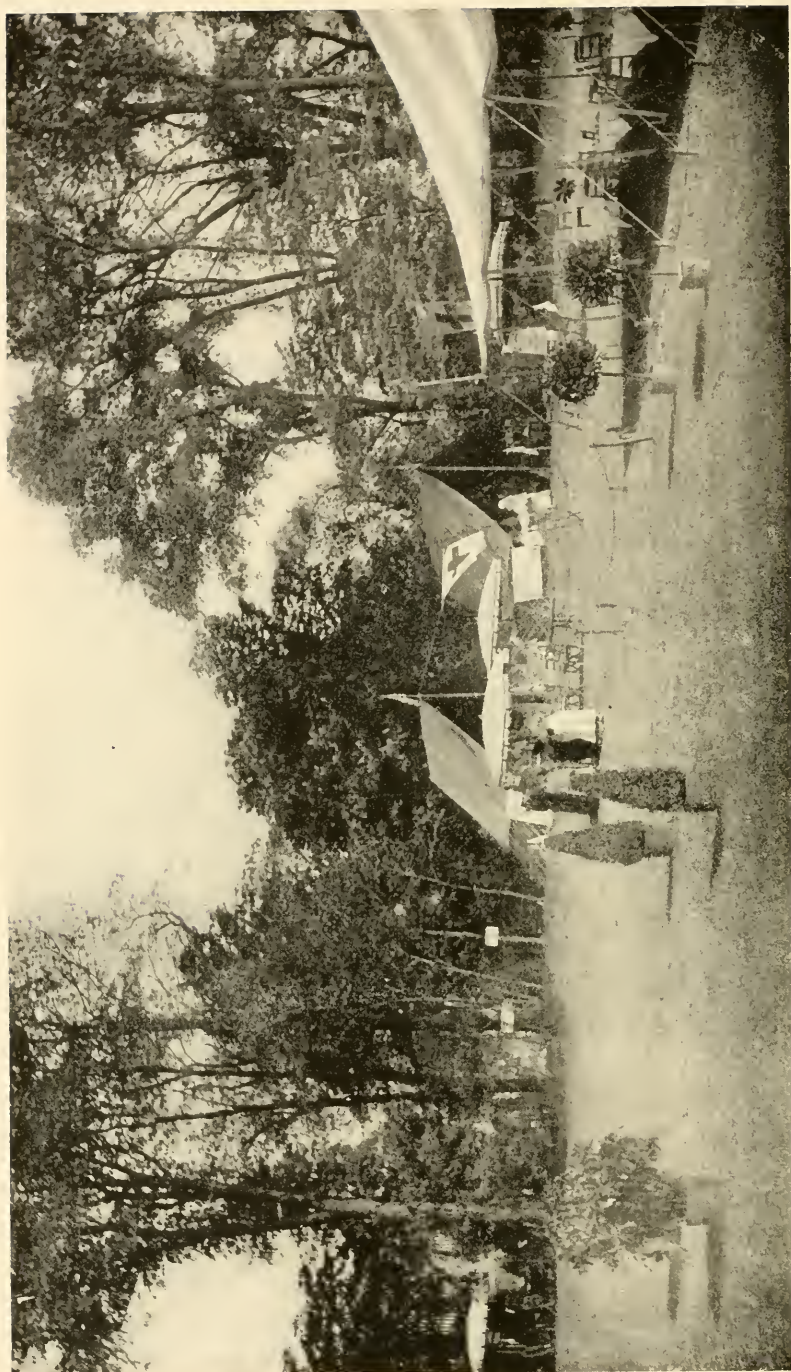
They issued the following schedule covering the various classes of competitors and their exhibits and fixing the prizes:

COMMERCIAL CLASSES

<i>Plants</i>	First Prize	Second Prize
Group of Rhododendrons, covering 100 sq. ft.	\$100	\$75
Group of Hardy Ornamental Flowering Trees and Shrubs, covering 200 sq. ft.	125	100
Group of Hardy Herbaceous Plants, covering 100 sq. ft.	100	75
Group of Orchids, any greens permissible, arranged for effect, covering 75 sq. ft.	150	100
Group of Stove and Greenhouse Foliage and Flowering Plants, covering 100 sq. ft.	100	75
Group of Hydrangeas, covering 100 sq. ft.	75	50
Group of Ferns and Selaginellas, covering 100 sq. ft.	100	75
Rock Garden, covering 250 sq. ft.	125	100
Group of Roses, covering 200 sq. ft.	125	100
Display of Water and Bog Plants, covering 100 sq. ft.	100	75
Bay Trees, pyramidal or columnar, 2 plants, not less than 10 ft. in height.	50	25
Bay Trees, standard, 2 plants, head not less than 5 ft. in diameter.	50	25
Box Trees, pyramidal, 2 plants, not less than 7 ft. high.	50	25
Box Trees, standard, 2 plants, head not less than 4 ft. in diameter	50	25
Box Trees, bush, 2 plants, not less than 6 ft. high.	50	25
Box Trees, 6 trained plants.	75	50
Conifers, Collection of 25 plants, 25 varieties in pots or tubs.	125	100
Group of Summer-Flowering Bulbous and Tuberous Plants for effect, Ferns permissible, covering 200 sq. ft.	100	75
Group of Bedding Plants, arranged for effect, covering 200 sq. ft.	125	100



A PEEP INTO THE SHOW GROUNDS FROM THE CLUB HOUSE



RED CROSS AND BOY SCOUT TENTS;

Cut Flowers

	First Prize	Second Prize
Display of Peonies, 100 sq. ft.....	\$25	\$15
Display of Cut Irises, 100 sq. ft.....	25	15
Display of Cut Hardy Flowers, 100 sq. ft.....	25	15
Display of Cut Sprays of Flowering Trees and Shrubs, 100 sq. ft.	25	15
Display of Cut Roses, 100 sq. ft.....	25	15

PRIVATE GROWERS

Plants

Group of Rhododendrons, covering 50 sq. ft.....	50	35
Group of Hardy Flowering and Foliage Trees and Shrubs, covering 50 sq. ft.....	75	50
Group of Hardy Herbaceous Plants, covering 50 sq. ft.....	50	35
Group of Orchids, covering 25 sq. ft.....	75	50
Group of Foliage and Flowering Plants, Stove or Greenhouse, covering 50 sq. ft.....	50	35
Group of Hydrangeas, covering 50 sq. ft.....	35	25
Rock Garden, covering 50 sq. ft.....	75	50
Group of Roses, covering 75 sq. ft.....	50	25
Group of Summer-Flowering Bulbous and Tuberous Plants for effect, Ferns permissible, 50 sq. ft.....	35	25
Hamper or Basket, 2 ft. diameter, raised at least 1 ft. from ground, filled with stove and greenhouse foliage and flowering plants for effect.....	15	10
For the largest pair of Palms.....	50	25

Cut Flowers

Display of cut Peony flowers, 50 sq. ft.....	15	10
Display of cut Iris flowers, 50 sq. ft.....	15	10
Display of cut Hardy flowers, 50 sq. ft.....	15	10

The show was held on the grounds of the Club at Bartow Mansion, Pelham Bay Park, June 1-4, 1916, and proved a great success. As being the first out-door flower show held in the vicinity of New York, it was in many ways a unique occasion. The account of the show which follows is taken, in part, from the *Florist's Exchange* of June 10, 1916, whose editor has kindly consented to have these notes reprinted here.

The first outdoor Summer show that has been held near New York was opened on the grounds of the International Garden Club at Bartow Mansion, near New York City, on Thursday, June 1, and remained open until over the Sunday.

The inauguration of this Summer show is due primarily to the president, Mrs. Chas. F. Hoffman, actively supported by Mrs. E. H. Harriman, Mrs.

H. de Berkeley Parsons, Dr. Geo. Norton Miller, and others who take a leading part in the club's affairs.

Early in February a meeting was called at Mrs. Hoffman's house 620 Fifth ave., New York City, when a schedule committee was appointed which got to work at once, the schedule being afterward adopted by the members of the International Garden Club at a meeting held at the Biltmore Hotel during the time of the New York Spring flower show. Since then matters have gone along quickly, and favored with glorious weather during the last week end, the club held its show.

Tents were erected on the lawns on the north front of Bartow Mansion, these being filled with groups of ferns, indoor foliage plants, orchids and cut hardy flowers, Roses, Irises and shrubs. A rock garden from Julius Roehrs Co. was also a feature, and out of doors there were handsome groups of evergreens. A tent was devoted also to school gardening under the direction of Mrs. H. Parsons, the originator of this work.

Several of the garden clubs were also represented in another tent by photographs of gardens of their members. These clubs comprised those of Rye, Greenwich, Somerset Hills, Bedford, Staten Island, and the Women's National Agricultural and Horticultural Ass'n. In the same tent the Hicks Nurseries, Westbury, L.I., had colored photographs of work done by them, representing some very beautiful garden scenes.

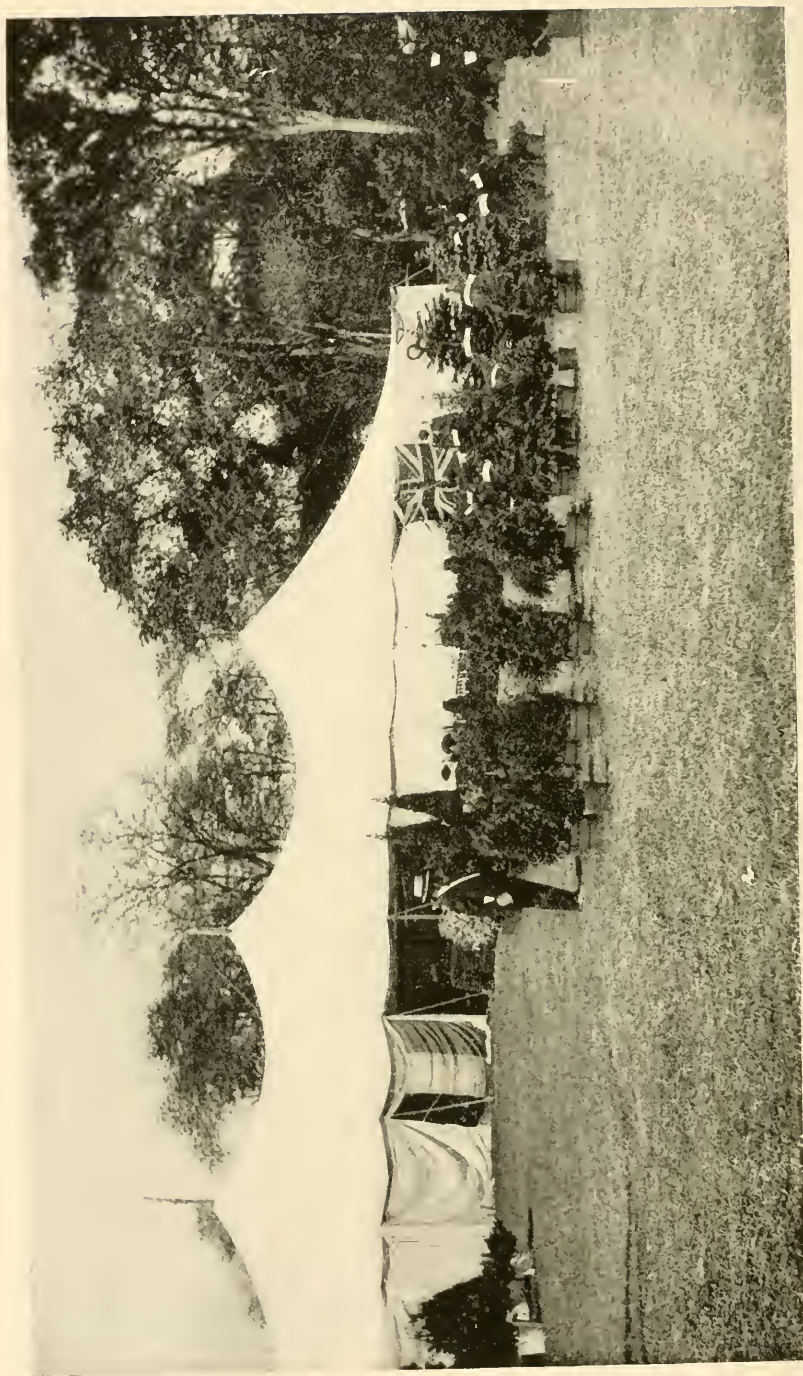
Judge Alton B. Parker, former nominee for the Presidency of the United States, in a short speech, declared the show open. He mentioned the fact that a gift of \$5000 had been given to the club by the sister of the late Gov. Higgins for the planting of evergreens on the estate as a memorial.

The schedule ran to 38 classes, with good prizes, which had been subscribed by individual members of the club, whose names were published in connection with the class to which their donation had been awarded. Section A for commercial growers, was well filled, but there were not so many entries in the private gardeners' section.

The question arises whether an early Summer show, successful from the competitive standpoint, can be assured, since the Spring season is so short and there is so much work to be done? It would be highly desirable if such a show could be maintained. There was nothing wrong with the date so far as getting a good show together was concerned, but possibly a show two weeks later might be even better as a pure Summer event, comprising Roses and a greater variety of hardy plants. Of course there is always the expectation of greater heat the further we get into June, or into the period of Summer. Considering the short time that elapsed from the first preparations until the event was celebrated, this show must be



CENTRE OF SHOW GROUND
EVERGREEN GROUPS IN THE FOREGROUND



GROUP OF EVERGREENS FROM
I. HICKS AND SON, WESTBURY, N. Y.

considered encouraging. We would suggest a two days' or three days' show at most, but there must be much longer preparation and greater advertising, while the members themselves must support the show with exhibits.

There were lectures and demonstrations of various kinds during the four days, together with music, and Morris dancing by Miss Crawford and Company of London, England.

The grounds around the mansion were most delightful in the first green flush of the early Summer, all so fresh and beautiful in themselves. The Spring display of Tulips was just passing over, although there were still considerable numbers in flower; these were in beds on the south front. The display here is intended primarily for Spring and Autumn effect, annuals being grown in the reserve garden close by for furnishing the beds after the Tulips and other bulbs are gone.

A Rose garden is another of the features in contemplation, and altogether this experimental and expository garden of the club is likely to be one of the most interesting and notable. The work of laying out and developing the garden is under the immediate professional charge of Arthur Herrington.

In the flower show, Harry A. Bunyard Co., 40 W. 28th St., New York, exhibited a table of cut border flowers, including Orange Marigolds, Antirrhinums, Gladioli, Statice Suworowi, which can be cultivated outdoors from seed and also makes a good pot or bench plant. This company had also a good selection of Sweet Peas and Centaureas.

Adolph Lewisohn (gdr. John Canning), Ardsley, N. Y., sent well grown Calceolarias, and a special silver medal was awarded also to Miss E. C. Schettler (gdr. Adam Paterscn), Saugatuck, Conn. for her beautiful seedlings of tree peonies.

Among the more notable of the Irises shown by John Lewis Childs, were Florentina and Fl. alba, the beautiful rosy mauve, Queen of May, the pale yellow Flavescens, and the rich yellow Honorable.

Among the notable shrubs in the group by the Hick's Nurseries, was *Andromeda paniculata*, with golden crimson bells, also *Cornus florida rubra*, Bechtels' Double Flowering Crab, a cut leaved form of *Syringa Persica*, and some very fine ornamental Maples.

Roehrs' rock garden had masses of *Armeria*, *Viola cornuta*, *Phlox canadensis*, *Myosotis semperflorens*, *Rhododendron arbutifolium* and other things.

In Roehr's group of tropical ornamental plants there was a basket trained plant of *Stephanotis floribunda*, with its waxy white fragrant flowers, evidently not well known to many of the visitors. This firm and also Lager

& Hurrell exhibited groups of orchids, while Rcehrs also had a collection of Fuchsias.

W. A. Manda, Inc., had some beautiful specimens of old Boxwood and an interesting Boxwood hedge cut to represent ornamental railing and many other exhibits, while F. R. Pierson Co. of Tarrytown, N. Y., had cut Roses and ferns.

The judges of the show made the following awards:

Commercial Classes

Group of Rhododendrons covering 100 sq. ft.: 1, W. A. Manda, So. Orange, N. J.; 2, F. R. Pierson Co., Tarrytown, N. Y.

Group of hardy ornamental flowering trees and shrubs covering 200 sq. ft.: 1, Julius Roehrs Co., Rutherford, N. J.; 2, W. A. Manda.

Group of orchids, arranged for effect covering 75 sq. ft.: 1, Julius Roehrs Co.; 2, Lager & Hurrell, Summitt, N. J.

Group of stove and greenhouse foliage and flowering plants covering 100 sq. ft.: 1, W. A. Manda; 2, Julius Rcehrs Co.

Group of ferns and Selaginellas, covering 100 sq. ft.: 1, W. A. Manda; 2, F. R. Pierson Co.

Rock garden, covering 250 sq. ft.: Julius Roehrs Co.

Bay trees, pyramidal or columnar, two plants, not less than 10 ft. in height: 1, Julius Roehrs Co.

Bay trees, standard, two plants, head not less than 5 ft. in diameter: 1, Julius Rcehrs Co.

Box trees, pyramidal, two plants, not less than 7 ft. high: 1, W. A. Manda; 2, Bobbink & Atkins, Rutherford N. J.

Box trees, standard, two plants, head not less than 4 ft. in diameter: 1, W. A. Manda; 2, Julius Roehrs Co.

Box trees, bush, two plants, not less than 6 ft. high: 1, W. A. Manda.

Box trees, six trained plants: 1, W. A. Manda; 2, Julius Roehrs Co.

Conifers, collection of twenty-five plants, twenty-five varieties in pots or tubs: 1, Isaac Hicks & Son, Westbury, N. Y.; 2, F. R. Pierson Co.

Group of bedding plants, arranged for effect, covering 200 sq. ft.: 1, Julius Roehrs Co.

Display of Peonies, 100 sq. ft.: 1, John Lewis Childs, Inc., Flowerfield, N. Y.; 2, Bobbink & Atkins.

Display of cut hardy flowers, 100 sq. ft.: 1, Bobbink & Atkins.



ROCK GARDEN
J. ROEHRS AND CO.
RUTHERFORD, N. J.



EXHIBITION OF CUT FLOWERS (NOVELTIES)
H. H. BUNYARD

Display of cut sprays of flowering trees and shrubs, 100 sq. ft.: 1, Isaac Hicks & Son.

Display of cut Roses: 1, F. R. Pierson Co.

Private Classes

Group of hardy flowering and foliage trees and shrubs, covering 50 sq. ft.: 1, Mrs. Wm. G. Nichols, Rye, N. Y. (Geo. N. Sullivan, gdr.)

Group of orchids, covering 25 sq. ft.: 1, Clement Moore, Hackensack, N. J. (J. P. Mossmann, gdr.)

Group of foliage and flowering plants, stove or greenhouse, covering 50 sq. ft.: 2, Mrs. John G. Flagler, Greenwich, Conn.

Group of Hydrangeas, covering 50 sq. ft.: 1, Mrs. John H. Flagler; 2, Mrs. Geo. D. Barron, Rye, N. Y. (James Linane, gdr.)

Group of Summer flowering bulbous and tuberous plants for effect, covering 50 sq. ft.: 2, Mrs. Geo. D. Barron.

Display of cut Iris flowers, 50 sq. ft.: 1, Mrs. A. M. Booth, Great Neck, N. Y. (E. Fordol, gdr.)

Display of cut hardy flowers, 50 sq. ft.: 1, Mrs. Wm. G. Nichols.

Special Awards

Collection of Tulips: Wm. Shillaber, Essex Fells, N. J. (J. P. Sorenson, gdr.)

Display of *Memesia compacta* Triumph: Wm. Shillaber.

Group of foliage and flowering plants, 100 sq. ft.: Mrs. A. M. Booth.

Hemerocallis Gold Dust and flava, 2 vases: John Lewis Childs, Inc.

Calceolarias, Hybrids, nine plants: Adolph Lewishohn, Ardsley, N. Y. (J. Canning, supt.)

Plant of *Brassia varicosa*: Miss Scheffler, Saugatuck, Conn. (Adam Paterson, gdr.)

Collection of herbaceous Peonies, seedlings: Miss Scheffler, silver medal.

Calceolaria Stuarti, 2 plants: Miss Scheffler.

Vase of outdoor grown Sweet Peas: Miss Scheffler.

Collection of cut flowers from shrubs: Mrs. Wm G. Nichols.

Exhibit of school garden plantings, model gardens, etc.: Dept. of Parks, Boroughs of Manhattan and Richmond.

Collection of cut flowers: Harry A. Bunyard Co., New York.

In addition to these prizes the secretary and manager of the show, Mr. Arthur Herrington, announced that the judges

recommended that the following should receive a Certificate of Merit.

INTERNATIONAL CHILDREN'S SCHOOL FARM LEAGUE, 47 West 34th Street, New York City. Mrs. Henry Parsons, President.

THE GREENWICH GARDEN CLUB for an exhibit of flowers from members' gardens.

THE RYE GARDEN CLUB for an exhibit of the Club Poster-photographs and flowers from members' gardens.

THE GARDEN CLUB OF NEW ROCHELLE for an exhibit of photographs and flowers from members' gardens.

THE BEDFORD GARDEN CLUB for an exhibit of photographs and flowers from members' gardens.

THE GARDEN CLUB OF SOMERSET HILLS, BERNARDSVILLE, N. J., for an exhibit of the Club Poster, seedling *Amaryllis* raised by a member and ferns; also photograph of work done by the Club at the Reformatory for women, Clinton, N. J.

THE PARK GARDEN CLUB OF FLUSHING sent a poster and schedules of shows to be held in June and September.

NATIONAL PLANT FLOWER AND FRUIT GUILD. Photographs showing scope and character of work.

WOMEN'S NATIONAL AGRICULTURAL AND HORTICULTURAL ASSOCIATION. Photographs and Literature.

NATIONAL SPECIAL AID SOCIETY. Literature and material.

MRS. CLARA L. POILLON, 125 EAST 70th STREET, NEW YORK. Pottery and Flower vases.

BOY SCOUTS. Recognition for help given especially by the boys taking tickets on Saturday should be accorded to the Deputy Commissioner. Mr. Clarke, 50 Madison Avenue, New York City.

The show was so successful that it is hoped that it may be repeated, probably at a later date than the one in 1916. The coöperation of the commercial growers was much appreciated, particularly in view of the fact that the show came just at the end of the spring season and that they were, therefore, put to greater trouble than would have been the fact a little later in the year. The inauguration of open air flower shows in New York is an enterprise well worth while, and it is hoped to continue and enlarge them, trusting that ultimately they may be made as delightful an outdoor recreation as they have been for years in England.



RHODODENDRONS, FLOWERING SHRUBS AND FOLIAGE PLANT GROUPS
FROM W. A. MANDA, SOUTH ORANGE, N. J.



GROUP OF LILIES AND GLADIOLI FROM
MRS. G. D. BARRON, RYE, N. Y.

*An Amateur's Rose Garden at the Beginning of the Twentieth Century**

By the Rev. J. H. Pemberton, Vice-President N. R. S.



BEING personally acquainted with the writer of the following paper, which the author entitles "An Amateur's Rose Garden as the Beginning of the Twentieth Century," this brief outline, at the Editor's request, is submitted by way of an introduction.

Monsieur Jules Gravereaux, a citizen of Paris, with a town house in the Avenue de Villars, and a charming country home in the village of l'Hay, is universally recognized as the leading French amateur rosarian. He is the permanent President of the French Rose Society and President d'Honneur of the Societe Nationale d'Horticulture de France.

Paris owes to him, in conjunction with M. Forestier, the laying out of the extensive Rose garden at Bagatelle in the Bois de Boulogne. He also supplied all the botanical species and most of the large collection of modern Roses to be found there. M. Gravereaux has written and edited several publications connected with the Rose, the chief of these being *Les Roses Cultivees a l'Hay*, a work of some 300 pages, *Les Roses de l'Impetrice Josephine*, and *La Rose dans les Sciences, dans des Lettres, et dans les Arts*.

* This and several of the following articles on Roses have been reprinted from the English National Rose Society's *Rose Annual* for 1914 and 1915. So many of the articles in this first issue are from abroad that our readers may wonder if the JOURNAL is to reflect American or foreign horticulture. Our horticultural debt to England and France makes it a privilege to devote so much of this first issue to their gardens. Later we hope to use more articles by Americans.—Ed.

Monsieur and Madame Jules Gravereaux reside in a beautifully furnished house at l'Hay, a few miles out of Paris, and adjoining the house is the Rose garden which forms the subject of this article. This garden contains the most complete collection of Roses in the world; Roses dating from several hundred years before Christ, down to those of the latest introduction. The garden is open to the public on certain days in the year, and the owner is at all times delighted to show visitors round and take them through his Rose museum; it is best, however, to make an appointment. Such a visit is an education in itself, and all lovers of the Rose, when stopping in Paris, should go and see it.

The village of l'Hay is about one mile from Bourg-la-Reine station, a twenty minutes' run from the Luxembourg terminus in Paris. A motor car from the centre of Paris will, in about half-an-hour, reach the "Roseaie de l'Hay," the home of M. Jules Gravereaux.

La Roseraie de l'Hay

By M. Jules Gravereaux



HAVING been invited by the National Rose Society to contribute a paper to its excellent *Rose Annual for 1914*, it was impossible for me to decline so great a compliment, although at the same time I felt in just a little difficulty as to the choice of a subject upon which my capacity would equal that of the distinguished English horticultural writers in whose company I should find myself. I therefore decided to explain the guiding principles in view when laying out *La Roseraie de l'Hay* and in making the subsequent alterations to it, feeling sure that by this means, even if lacking any other attainments, I should escape the reproach of not being acquainted with the subject dealt with.

Some Considerations on Rose Gardens

The number of Rose gardens is nowadays considerable, and they are increasing year by year. Nobody would venture now to plant, as of old, his Rose trees in the flower garden, still less in the kitchen garden. At the beginning of the twentieth century it is beyond question that every decent estate, should somewhere or other, in a suitable position, include a Rose garden.

These Rose gardens are designed in various different ways, but still, if we examine only their contents without taking into account the style and way in which the Rose trees are presented, we may it seems to me, reduce them to two principal types, viz., the decorative Rose garden and the Rosary or Rose garden *de collection*.

I mean by the decorative Rose garden one in which the sole object in view is the composition of a pretty picture without

troubling too much about making room for a well defined collection of varieties or of utilizing the principal resources afforded by the most beautiful of flowers.

This kind of Rose garden, which may be termed a garden adorned with Roses, is very much in vogue today. Landscape gardeners have quite a decided fancy for it because they can, by using only the varieties required, carry out the decorative effect they desire. The decorative Rose garden is consequently more often than not a very pretty garden. Is that all that we should expect in a Rose garden? I think not.

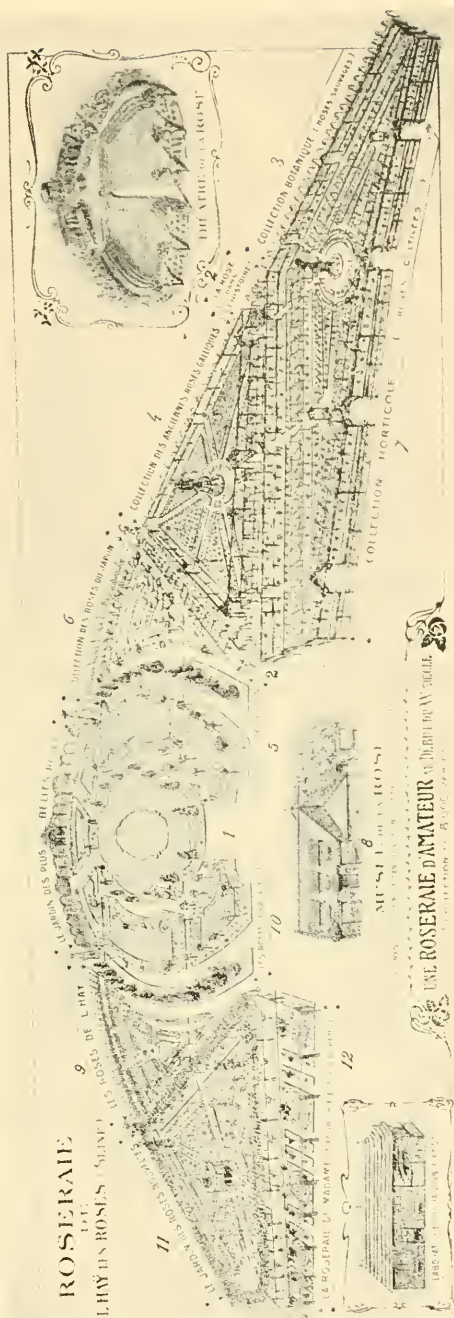
Many lovers of the Rose will, I think, consider I as do, that the Rose Garden should not be made for ourselves alone but also for the Rose; that it ought to exhibit, if not all the forms, at least a certain number intelligently chosen, and that even should the garden art suffer from it, the plan of the Rose garden should be subordinate to the number and nature of the varieties that have been decided upon by the owner. Or to put it in other words that the real Rose garden should not be merely decorative, but contain a collection more or less numerous resulting from a deliberate selection.

The purely decorative Rose garden is like a pretty woman without brains. She may attract attention for a time, but does not retain it. It is like leaving to the upholsterer the decoration of a public or of a general apartment which one visits perchance with pleasure, but in which the visitor has no desire to reside.

Quite different is the *Rosary de collection*. This is the result of an intimate coöperation between the Rose lover and the landscape gardener; it satisfies at once the eye and the mind. The interest in it is continually awakened by its variety. The visitor feels himself conducted by an enlightened mind which has known how to select everything which the Rose can offer that is most beautiful, most charming, most curious, most uncommon, and most up to date.

As for the proprietor of this Rose garden, he prepares for himself deep joys which every season will revive, for he will always change, increase, or beautify his collection, and the sat-

187.
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LA ROSERAIE
de l'HAY

isfaction which the Queen of flowers dispenses to her fervent admirers is exquisite and indefinitely renewed. This Rose garden deserves, in my opinion, the epithet which M. Corpechat has so happily applied to the Gardens of LeNotre, that is "the Rose Garden of Intelligence." Is it difficult to create such a Rose garden? No! It is sufficient for the purpose to know the Rose.

No science can be more attractive, none can be easier, provided we can find grouped together and suitably presented the materials requisite for its study. It is to create this desire of knowing the Rose, and to give the practical means of acquiring this knowledge, that in my humble way I have laboured during the past twenty-five years.

At Malmaison, whose distinguished Superintendent, M. Ajalbert, applied for my assistance, there have been gathered together all the Roses known in France at the time of the First Empire. At Bagatelle, when the City of Paris honoured me by asking me to construct a Rose garden, I wished to create a *Roseraie-ecole*, comprising the 1,200 best varieties of today systematically classified. At l'Hay, on my own little estate, I aimed at something higher, for it was my ambition to get together as complete a collection of the different forms of the genus *Rosa* as was possible.

These three Rose gardens are not given as models to be copied literally, for their instructive character is unmistakably well shown, and they are collections of which the gathering together and the upkeep represent a very considerable amount of labour. But I think it can be claimed that while still being very fine gardens, these Rose gardens demonstrate clearly what the Rose has been, what it is today, and what resources it offers to us. I wanted to create some vocations, and also to teach amateurs who were already convinced. Was the ambition a high one? Have I succeeded? It is not for me to say. However that may be inasmuch as the National Rose Society now offers me its hospitality, I will let the English rosarians judge for themselves the efforts attempted at l'Hay.

La Roseraie de l'Hay

Laid out again and enlarged two years ago, the Roseraie de l'Hay is at the present moment in the form of huge fan. It is nearly five acres in extent, and as a whole comprises a series of departments each containing a well-defined collection. The first of these departments, the introduction to the Rosary, is the retrospective collection.

Retrospective Collection

Here is exhibited a series of characteristic types showing the different aspects of the Rose throughout the ages. On one hand are the wild Roses, classified according to a new standpoint, the probable order of their dispersal on the face of the earth, and according to their general physiognomy.

Firstly the most imperfect Roses, which must have been the earliest comers. *Rosa berberifolia* with simple leaves, *R. maracandica*, *R. minutifolia*, *R. microphylla*, etc.; then the Roses with prickles, the epidermis covered with hairs and fine acicules, whose habitats are the high altitudes, *R. Webbiana*, *R. sericea*, *R. acicularis*, etc.; then the Roses without prickles of the lower mountains, *R. alpina*, *R. ferruginea*, *R. cinnamomea* etc.; the Roses of the forests, needle-prickled, *R. canina*, *R. rubiginosa*, *R. oxyodon*, etc.; then the Roses of the warm climates with shiny foliage, as *R. bracteata*, *R. laevigata*, etc.; and lastly the Roses with perfect organs, probably the most recent, *R. indica*, *R. moschata*, *R. multiflora*, etc.

Facing these wild Roses are the cultivated ones which we can, starting from the Greek civilization, know with some certainty. Beginning with the Roses of Theophrastus, the *centifolia* and the Rose of Mount Pangaeus, and concluding with the most recent races, *wichuriana* and *Pernetiana*, about fifty types show the successive stages of our garden Roses.

The history of these Roses comprises three periods, viz.; From the earliest times to the end of the Eighteenth century is the reign of the *centifolia* and Provins Roses; at the end of the eighteenth century was the period of the importation into

Europe of Roses altogether different, those which came from the Far East; and finally in the nineteenth century appeared the new races, the results of crossing the latter with our ancient varieties. After this hasty initiation into the history of the Rose, the visitors arrive at the botanical collection.

Botanical Collection

In a long alley are arranged according to M. Crepin's classification, the species, sub-species, and varieties, hybrids and sub-genera divided into sixteen sections. The identification of these Roses has been accomplished with the coöperation of M. Crepin, M. Maurice de Vilmorin, M. Bois, M. Cochet-Cochet and others, that is to say, by persons whose ability is universally admitted.

In this collection of nearly 900 subjects alongside of the species from which our garden races have been raised, one can see a goodly number of wild Roses which have not yet been or have been but very seldom used for intercrossing or improving in any way other sorts such as *R. bracteata*, *R. laevigata*, *R. ferruginea*, *R. clinophylla*, etc. Perhaps some day these superb bushes, whose flowers are lacking in the essential beauty, will give rise to some descendants that will revolutionize the Rose world as did the hybrids of wichura.

These wild Roses are not well enough known, not used enough in the decoration of our pleasure grounds. What is there more beautiful than a clump of *R. sericea* with its main prickles disposed in pairs at the base of its leaves, its light foliage and its cherry-like fruit?

By way of continuation to the botanical collection is the garden collection. The cultivated Roses at l'Hay are divided into two groups; the old Roses or Gallic Roses, for they belong to the section of *R. gallica*, and the modern ones the Roses of the nineteenth century.

The Gallic Roses

The Gallic Roses are the *centifolia* of perfect form, the *provins* of dazzling colour, the *alba* so dainty, the Damask of exquisite

perfume, the Pompons so charming, the Portland of lengthy duration in their flowering. All these Roses were the delight of our grandparents, but they have gone out of fashion because they do not happen to be perpetual blooming. What injustice! and what ingratitude!

It is true they are not perpetual, but is not this inferiority counterbalanced by the abundance of their first flowering and the vigour of their growth? And then, do we not owe to them a large number of delightful works that they have inspired our poets and our artists to produce? About 650 of these delightful but abandoned varieties have been got together at l'Hay and are preserved there with the utmost care.

The Malmaison Roses

Those of these ancient Roses which are contemporary with the First Empire are arranged apart. This collection of 200 roses or thereabouts is twice as large as the La Malmaison collection was.

With the Gallic Roses are mingled a few recently introduced Beals and a few Pimprenelles. How delightful were the roses at that time! *Thalie la Gentille*, *Rosée du Matin*, *Ornement de la Nature*, *Triomphe de Flore*, *Assemblage de Beautés*, etc.

Garden Collection

The garden collection is modern and comprises the Roses for the most part of the nineteenth century, the progeny of crosses, accidental or designed, between our old Gallic Roses and the newcomers from the Far East, China Roses, Bengals, Indian, introduced at the end of the eighteenth century. These roses have been arranged according to Crepin's classification in sections, races, and groups.

Hybrid Perpetuals are very numerous. They have long been in favor. At l'Hay there are nearly 4,000 of them, distinct varieties divided into twelve groups. There are the offspring from *La Reine*, from the *Baronne Prevost*, from *General Jacqueminot*, from *Victor Verdier* and the like.

Tea Roses are numerous also; they are gathered into three groups. The Safrano group, the Comtesse de Labarthe group, and the group of various Teas.

The Hybrid Teas are the monarchs of the day. We have every year to enlarge the area allotted to them, and at the present time the need for their division into distinct groups makes itself manifest, and upon this I am now at work.

Beside these three great families are other races which have each their individual merits. The Bourbons, the Bengals, the Noisettes, and especially the dwarf polyanthas. Then on the porches and pillars can be observed the climbers or ramblers, Tea, Noisette, Banksian, and the *multiflora* and *wichurana* of such brilliant decorative effect.

Each one of these Roses in the garden collection, after its identity has been checked by a jury of eminent rosarians, has been labelled, marked at the foot with a leaden ring, and possesses in the office a card upon which are entered the name of the raiser, the date when raised, its pedigree, characteristics and supplementary details. It is obvious that I cannot claim absolute completeness for the garden collection, but still do not think it is possible to get a more extensive one together. There are to be found probably 12,000 to 13,000 names of Roses, but a large number of them are today mere names and that only. At l'Hay we have got somewhere about 7,500 varieties; there can hardly be many more in existence.

New Roses

The new Roses, those of the twentieth century, have their little private rosary where they are shown in groups, larger or smaller, according to their merits.

Would the reader like to know the names of those which are the most highly thought of? There are Mrs. A. R. Wadell, Jonkheer J. L. Mock, Lady Hillingdon, Colonel Leclerc Viscountess Enfield, Mme. Edouard Herriot, Laurent Carlier, Commander Jules Gravereaux, Sunburst, Mrs. Aaron Ward.

Roses Awarded Honours at Bagatelle

Those of the Roses that have been awarded honours at the annual displays at Bagatelle are planted in an alley of honour. It is pleasing to be able to state that the English Roses are there to be seen in numerous examples. We admire Mr. W. Paul's Mrs. Duley Cross; Mr. McGredy's Lady Alice Stanley, Mrs. Amy Hammond and Mrs. E. J. Holland; and the handsome seedlings of Mr. A. Dickson, Mrs. Peter Blair, Dorothy Page-Roberts, Molly Sharman-Crawford, Walter Speed and Mabel Drew that received an award last year.

The Oriental Roses

A little rosary laid out in Japanese style has been reserved for the Roses of oriental origin. In it are *R. Watsoniana*, *anemoneflora*, *lutea*, *clinophylla*, etc., and the pretty garden descendants of *R. wichura* and *multiflora*.

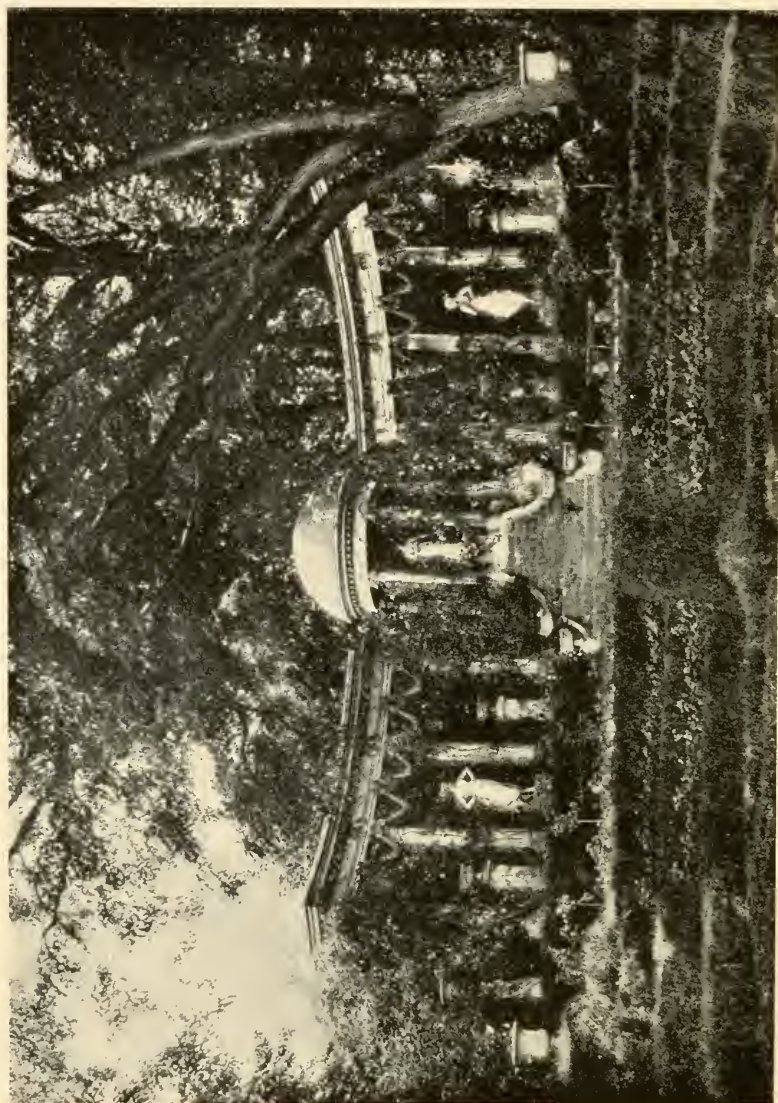
The Roses of l'Hay

Similar to the preceding one, but of smaller dimensions, is a rosary that comprise the novelties raised at l'Hay, for the most part hybrids of a Rose which has been well worked upon here, *R. rugosa*.

The Rosary of the Finest Roses

Finally forming the centre of the whole is a large elliptical garden in the French style, where with nothing but Roses we have endeavoured to imitate the gardening of the seventeenth century. Large standards in boxes replace the classic orange trees, pillars covered with *wichuraiana* resembling pyramid yews and large monochromatic borders furnished with our finest Roses give an air of grandeur to the whole design.

The following are the names of a few of the finest Roses in this garden: Mme. Caroline Testout, Captain Christy, Frau Karl Druschki, Prince de Bulgarie, Mme. Ravary, Mme. Abel Chatenay, La Tosca, Mrs. John Laing, etc.



THE THEATRE
LA ROSERAIE de PHAY

The Trial Garden

Behind the trellis forming the background of the rosary just referred to is the trial garden. There are the Roses to be studied or proved, the new seedlings under observation, the experiments in course of being made, and not far away the laboratory for the extracting of the essence.

The Ladies' Rosary

Nowhere is it ever permissible to gather a Rose. This profanation is only tolerated in a little special garden, the ladies' rosary, in which may be found the hundred best varieties for cut blooms, Ulrich Brunner, Liberty, Paul Neyron, etc., and those delightful polyanthas which make such pretty basketfuls for the table, Mrs. Cutbush, Orleans Rose, Phyllis, etc.

The Museum

To these collections of living plants was added fifteen years ago an important collection of documents devoted to or inspired by the Rose. In the scientific section there are a library, herbarium, fossil remains, etc. Thousands of tales, sonnets, odes, and fables demonstrate the influence of the Queen of Flowers on the literature of every country.

Then last of all from the artistic standpoint, alongside of wall papers, textile fabrics, prints, porcelains, trinkets of all kinds, can be seen the works of our best contemporary Rose painters—Mme. Madeleine Lemaire, Mlle. L. Abbema, Messrs. Bienvenu, Jeannin, Filliard, Cesbron, etc.

A theatre at the end of the garden collection is intended for the representation of works devoted to the Rose.

At this point I will bring to a close the enforced promenade that I have inflicted upon the readers of this already too long article in the hope that they will excuse me for having dwelt at such length upon the subject.

Never has the opportunity been afforded me before of plead-

ing my cause before so numerous and so select a body as the members of the National Rose Society. To ask a rosarian to discourse briefly on his pet hobby before such an audience would be to ask for the impossible.

The Rose Garden at the International Garden Club, New York

By W. Adams Delano



LOOKING for a spot to build the Rose Garden at the International Garden Club, at Bartow, several things had to be considered. The soil must be good and not too light; the drainage must be perfect; the exposure to the south, and above all, (for the other conditions might have been artificially created), the garden had to be accessible for the public, as well as for the members. All these conditions, however, were found in the remains of an old apple-orchard near the main entrance to the Club, just East of the entrance drive. Here the soil was excellent, the land sloped gently in the right direction, the drainage was good, and it is only a step from the entrance gate and from the Club House. And the old apple-trees, if they can be preserved, will give an air of age to the Garden.

In arranging for this Garden, the directors very properly decided to follow rather closely, though not on quite as extensive a scale, La Roseraie de l'Hay, which was laid out by M. Jules Graveraux. The method of division and classification is his, and while some of the minor sub-divisions have been eliminated for lack of room, the main groups are the same as at La Roseraie de l'Hay.

Every garden to be enjoyed must have a sense of privacy. It will not do to have motor cars whizzing by in full view, nor can the beds dwindle off into daisy fields without well-defined boundaries. The eye of the beholder is a wandering member

and only too ready to be diverted from its main object. On the same principle an artist frames his picture, which if hung against a wall without a frame would never hold its own. Hence in planning this garden it was one of the chief objects of the committee to surround it with a frame, and what could be more appropriate for a Rose Garden than an arbor covered with a profusion of rambling, climbing roses. Outside this wall would be softened and concealed by a planting of vines and trees, which stretching their branches over the wall on the north, east and west, would add another charm to the Garden and keep off the cold winds.

The ground itself suggested the arrangement of terraces into which the Garden has been divided, in fact it almost imposed the scheme, leaving very little for the architect to do except pull the whole together, with walls, balustrades, and steps.

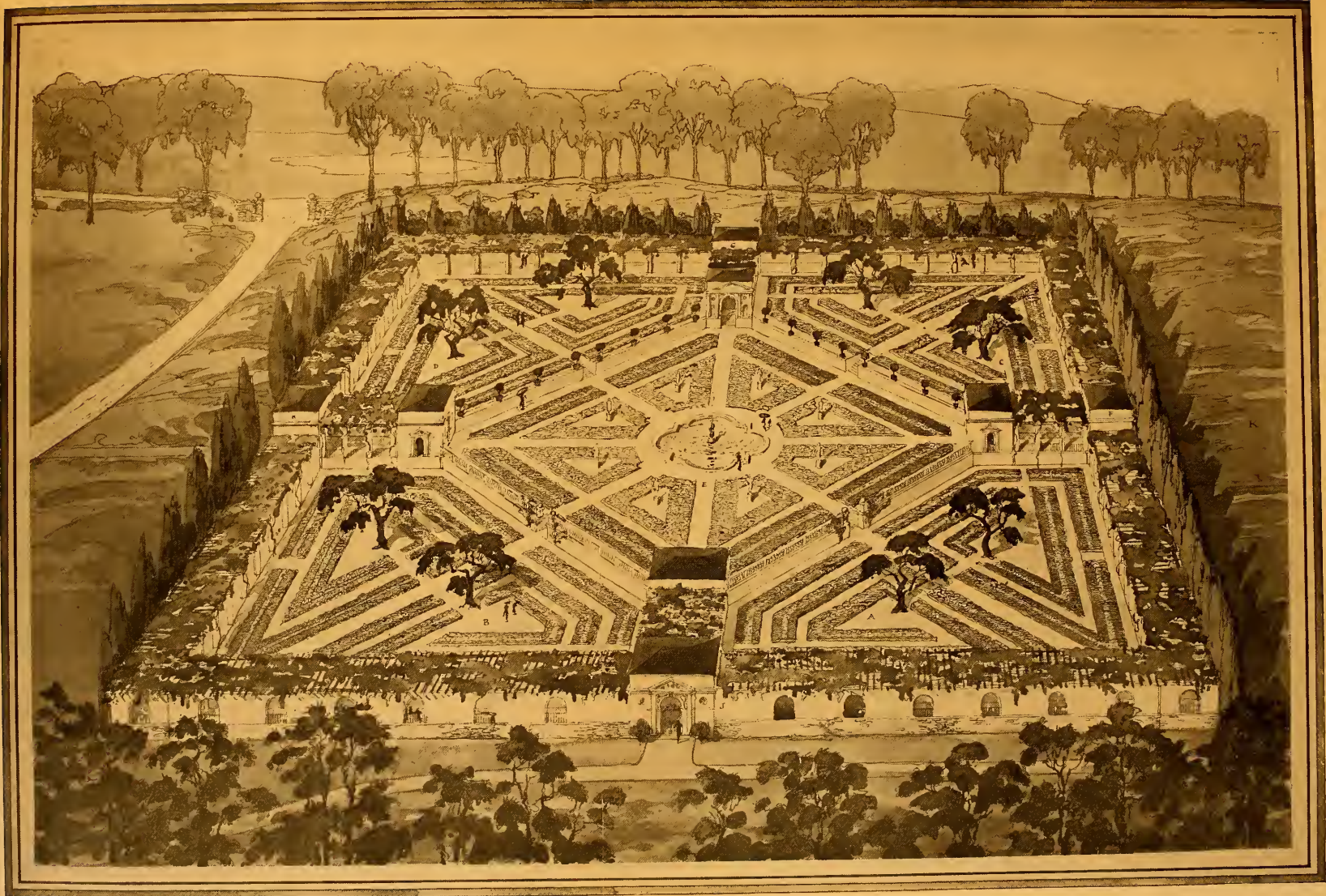
The picture of the garden which accompanies this article shows a division of five parts, on three different levels, which are allotted as follows.

The terrace marked "A" is reserved for an historical collection of roses. Beginning with the wild rose, there would be found on this terrace all the well-known and esteemed varieties of roses. The ones which are known to have existed in classical days, the Provins and the roses from the Far East, and finally the result of crossing these various stocks, which has given us the wonderful roses of the nineteenth century.

On the terrace marked "B" will be found a botanical collection where one who is interested in roses will be able to study them as classified by M. Crepin, in species, sub-species and varieties, hybrids and sub-genera, divided into sixteen sections.

The terrace lettered "C" will contain a collection of modern roses, belonging to the nineteenth century, for the most part the result of crossing the old French roses with those from China, India and Persia.

Terrace "D" will contain the new roses of the twentieth century, those that are most esteemed for their color, their perfume or their perfection of bloom. These roses are being pro-



PROPOSED ROSE GARDEN FOR
THE INTERNATIONAL GARDEN CLUB
BARTOW MANSION, PELHAM BAY PARK, NEW YORK CITY
DELANO & ALDRICH ARCHITECTS

- | | | | |
|---|----------------------------------|---|---------------------|
| A | Historical Collection | F | Card Catalogue |
| B | Botanical Collection | G | Literature of Roses |
| C | Modern Collection (19th Century) | H | Pictures of Roses |
| D | New Roses (20th Century) | J | Entrance Gates |
| E | Collection of Finest Blooms | K | Propagating Garden |

duced almost daily, one might say, so that it would be almost impossible to have a complete collection, but it is the hope of the directors to make it as nearly so as possible.

Lastly in the centre, surrounding a fountain, is the terrace on which will be placed a collection of the most perfect roses: Madame Caroline Testout, Captain Christy, Frau Karl Druschki, Madame Ravary, La Tosca and others.

Just a word about the arbor and the small houses which are shown in the picture of the garden. The one in the immediate foreground marked "J" is the main entrance to the garden. This house stands on the same level as the two lowest terraces "A" and "B" and from it one will gain the first glimpse of the garden. It will contain a stairway leading to the central terrace "E." One can either mount this stairway and find himself in the heart of the garden, or turning to right or left, walk under the arbors to the small house, marked "F," where the card catalogue will be found or to the house marked by the letter "H" where a collection of pictures of roses will be on view. To reach either of these small houses which stand on the level of the central terrace, one would have to ascend a short flight of steps under the arbor and again another short flight to continue the journey around the arbor and arrive at the library, which is marked "G," and where all the literature pertaining to roses that can be found will be collected.

In short, it has been the effort of the directors and the architect to make the trip around the garden, by the differences of levels and divisions, as interesting and amusing to the lover of roses as possible, and to give to the student of roses a clearly marked and classified collection, as complete as the area will permit. Benches will be placed at many points of vantage where the visitor may rest and drink in the charm of the Queen of Flowers.

It is to be hoped that this plan of the directors will soon be realized. Near Paris and London and all the great European cities, such rose gardens are to be found, but New York, with all its material wealth, has as yet no place where the rose can be studied and enjoyed by the general public.

Autumn Flowering Pillar Roses

By *H. R. Darlington, Vice-President N. R. S.*

"Pillar Roses, some rising here and there, like the proud standards of victorious troops; some meeting in graceful conjunction like our forefathers and foremothers in the stately minuet—bowing themselves like tall and supple cavaliers into arches of courtesy."—DEAN HOLE.



THE cultivation of Roses in the form of pillars or tall pyramids is, undoubtedly, both one of the most interesting and decorative methods of growing the Rose, and at the same time one of the most difficult in which to achieve exactly what one desires.

Dean Hole recognized the beauty of Pillar Roses and the care required for success. He says, "I must offer to amateurs a respectful caution—that to grow single specimens in isolated positions where they will invite, and ought to satisfy special criticism, knowledge of habit and experience in pruning will be indispensable. Melancholy results must inevitably ensue from ignorance or inattention, and I have shuddered to see examples of both in long lanky trees, without any lateral shoots, flowerless, and leafless for three-fourths of their height, reminding one of those shorn disgusting poodles, profanely termed by their proprietors "lions" as they stand on their execrable hind legs to beg."

The Pillar Rose must be so grown that it is clothed down to the base with foliage if not with flowers. There can be little question that the easiest Roses for a beginner to grow as pillars are the *wichuraiana* and a few of the nearly allied *multiflora* hybrids. With these the problem presents few difficulties. When

the flowering is over, or during autumn, the stems that have flowered are cut off, a few of the strongest young shoots—four is generally enough—are trained up, and the remainder of the young shoots which it is proposed to retain are wound round and round the pillars right from the base and securely tied. Little further attention is required beyond the watch for and precautions against pests and diseases until pruning time comes round again. A good dozen for this purpose would be:—Red, Diabolo, Excelsa, Hiawatha; pink, Dorothy Perkins, Lady Godiva (or Dorothy Dennison), Evangeline; Salmon, Leontine Gervais, Paul Transon, Francois Juranville; cream or yellow, Alberic Barbier, Francois Foucard, Shower of Gold; but these are altogether different in character from the autumnal flowering Roses which are the subject of this article, and if easier to manage are to some of us of less interest.

Supports

Something must be said of the supports to be used. Dean Hole arrived at the conclusion that wood was objectionable not only from its liability to decay, and the production of fungi, but also on account of the open house it provides for insects, and he held that the supports for Pillar Roses must be of iron.

But there are very considerable objections to the use of iron also, and Mr. Courtney Page writes to me:

I would like to point out that more damage is done to the growths of Pillar Roses if iron stakes or wires are used as their supports than one would think. The action of the wind on the plants—no matter now securely they are tied—causes them to rub against the metal supports, and sets up what appears to be, and sometimes is canker. Wood should be the material used, as it is warmer and smoother than are cold, rusty, and therefore rough iron supports.

A rot proof base is, however, essential, and the part just at the surface of the ground—just between wind and weather—is the most subject to decay. A wooden top and rot proof base is therefore the best combination to employ.

I have described in detail the method I adopt to secure this combination in the *Rose Annual for 1909* (pp. 148, 149). A 4 inch or 6 inch drain pipe is sunk in, and flush with the ground, a piece of gas pipe placed in the centre projecting above the drain pipe, and the space between the two filled in with cement. Then four or five bamboos, 8 feet long, are bound round the gas pipe with wire. I have only this to add, that at first I only allowed the gas pipe to project about 2 feet. I have found this insufficient, and it is better to have a longer pipe, 3 feet 6 inches above the ground level. Also that the top of the gas pipe should be closed either with putty or cement, or with a cork which, if used, should be painted over to prevent decay.

Whatever support is used when the Rose is taken down for its annual pruning it is a useful, and in my garden a necessary precaution to carefully cleanse the support by washing well with some strong insecticide in order to destroy insects and fungus spores, which are almost certain to have found a lodging in some nook or cranny of the support; I find hot water and Sanitas Powder useful for this purpose.

Selection

The Roses dealt with in this article were selected as follows: First of all I made a list of the Roses I am growing as pillars in my own garden, and from this list I removed all those varieties which for one reason or another were not to be generally recommended. Thus Noella Nabonnand, Francois Crousse, and Climbing Papa Gontier were removed because they do not, with me, prove satisfactory as pillars; and the Rugosas, Mme. Lucienne Willeminot and Mme. Balln and other, because I recognize that though they make fine pillars, they are not Roses for everyone.

Again, a further revision was made by striking out Roses which, either to me or to my friends, have appeared to be too new for any certain or confident description, or not of sufficient garden value.

The Editor addressed some interrogatories with regard to these Roses to several of our friends, and the following ladies

and gentlemen have very kindly sent to me the result of their experience: Mr. G. Burch, Mr. C. E. Cant, Mr. Frank Cant, Mr. A. Dickson (Belfast), Mr. Doncaster, Mr. Walter Easlea, Mr. John Green, Mr. E. J. Hicks, Mr. W. J. Jefferies, Miss B. H. Langton, Mr. Courtney Page, the Rev. F. Page-Roberts, Mr. A. E. Prince, Mr. A. Turner, Mrs. Weber, and Dr. A. H. Williams. I have before now laid stress on the insufficiency of the experience of any one garden, wherever situated, and however careful may be the observer, to test the character of any particular Rose, and my thanks are particularly due to these our friends who, by giving me the accumulated result of their experience, have conferred on this article any value it may possess.

It is rather curious that of the five Roses which were cut out of my list on the ground of being too new or insufficiently known, all except one were red Roses; these were Climbing Liberty (May, 1908) Climbing Richmond (A. Dickson, 1912), Florence Haswell Veitch (Wm. Paul, 1911), and Sarah Bernhardt (Duvreuil, 1907), the exception being Pink Pearl (Hobbies, 1912). The latter, derived from Una and Irish Elegance, is decidedly a new break in autumn flowering Roses of climbing habit, and, so far as I can judge, appears a great acquisition. Of the four red Roses Sarah Bernhardt is the oldest, and has a fine crimson colour and good perfume, and gets up to the top of an 8 foot bamboo without difficulty. The flowers are perhaps a little thin and sometimes apt to be rather ragged, but it is a Rose that has been rather overlooked, and seems to me quite useful for our purpose. Of Climbing Liberty and Climbing Richmond the former seems the stronger grower, the latter the more free flowering. I incline to think Climbing Richmond will make a useful pillar when better known. Mr. Dickson tells me it does well when established, and it certainly flowers freely in autumn. Florence Haswell Veitch has many of the qualities of Sarah Bernhardt, but it is a far better shaped flower, and seems to me most promising. Another crimson Rose I grow as a pillar is Avoca. Grown in this way it is far more free flowering than as a cutback, and has given me some fine flowers. It is omitted partly because it is somewhat

difficult to keep furnished at the base as a pillar, and partly because it is hardly sufficiently decorative in the garden, and is perhaps best grown pegged down. Dr. Williams thinks Mrs. W. J. Grant better than some in my list. My reason for omitting it is that I have never succeeded in keeping it for any length of time in good form as a pillar. Sooner or later it has always become leggy and bare at the base. This tendency can be counteracted by keeping it tied down in spring until the lower buds start; but I have found it so difficult to keep clothed that I have given up growing it in this fashion. He also thinks well of Gruss an Teplitz, J. B. Clark, and Trier for this purpose, and generally I agree.

Two Roses I have rather reluctantly omitted are the pink and the white *Pissardi*. These Roses are natural hybrids, probably derived from *R. moschata*, and possess the perpetual character, flowering freely throughout the season, though the first blooming is more copious than any afterwards obtained. With me the pink form is a very rampant and strong grower, after the first flowering is over constantly pushing up bright panicles of pink flowers. The white form is even more free in autumn, but is not so rampant, and tends rather to form a bush than a pillar. The growth of both forms is rather bramble-like in habit, and perhaps rather untidy. The foliage is good and free from mildew. I gather that few of my friends have experience of these Roses as pillars, and this decides me to omit them.

Mr. Easlea sends me a list of Roses he thinks might have been included in my selection. Besides some of those I have mentioned, these include Aimee Vibert, Aimee Vibert a fleurs jaune, Climbing Cramoisie Superieure, Gloire des Rosomanes, Climbing Mrs. W. H. Cutbush, Crepuscule, Johanna Sebus, Rosette de la Legion d'Honneur, Sylvia, Zephirine Drouhin, and Mrs. Chandler. I do not happen to have grown any of them in this particular way.

Some of the varieties in my list I have described in previous numbers of the *Rose Annual*, and I propose to treat of them here solely from the point of view of their suitability for use as Pillar Roses.

Alister Stella Gray, N. (Paul and Son, 1894), "Rose Annual," 1911, p. 27

I think all my friends are agreed that this Rose is easy to grow into a good, if somewhat bushy Pillar; some recommend keeping it about 6 feet high, though it will attain 8 feet or 9 without difficulty. Few find any trouble in keeping it clothed to the base, but, of course, the higher it is taken, the more care is required in this respect.

As it flowers fairly well on the old wood it is not necessary to remove this every year, but thin laterals should be shortened in, and thinning should be practised when at all necessary. Some of my friends regard it as slightly tender. Mrs. Weber points out to me that the reason of this is that its late autumn growth is often not sufficiently ripened. This, to my mind, points to pruning rather late in spring, so that the wood may be carefully examined, and unripe shoots removed or shortened back. Others prefer pruning in autumn. The chief objection to this is that it often happens that the Pillar has to be looked over again in spring. Mr. A. Dickson (Belfast) tells me the plant does not grow so freely in the north as it does in the south, and that in a damp climate it is wanting in colour. Alister Stella Gray flowers freely and well in autumn, the chief if not the only objections to it as a Pillar Rose are that it is somewhat slow in growth, and the habit naturally rather bushy.

Ards Rover, H. P. (A. Dickson and Sons, Ltd., 1894)

This was the first of the Roses with which Ards name is associated, the other two being Ards Pillar (1902) and Ards Rambler (1908), and is perhaps still the most generally useful of the three. It is quite easy to grow as a Pillar Rose, making long shoots, sometimes 15 feet long from the base, and it is not difficult to keep well covered; it carries its foliage late into the autumn. It is suitable for a Pillar of any height between 7 feet and 10 feet. The pruning should take the form of thinning out the old wood to allow the young canes free scope; where an old stem is retained (and I find it is generally desir-

able to keep one or two), and laterals should be shortened back to four or six buds.

It flowers freely and well in early summer, the blooms being fairly large, nicely shaped in the bud, and of a fine crimson colour, which look well in the garden. The autumn flowering is sparse and, particularly in wet weather, the colour is not so bright as in summer, but in favourable weather they look well. The sparseness of the autumn flowers, and a slight tendency at that time of the year to mildew, are its worst defects as a Pillar Rose; its good qualities are its ready and rapid growth, the ease with which it adapts itself to life on a Pillar, and its bright handsome colour and fragrance.

Celine Forestier, N. (Trouillard, 1858)

This old Rose is a favourite with me as a Pillar, but I find a good deal of difference of opinion as to its merits among my friends. Some think it difficult to grow well, and not free enough, others consider that it is not now wanted, while others again agree with my experience that it is quite easy to grow as a Pillar and flowers freely. Probably Mr. W. Easlea has hit the nail upon the head in adding "when the situation suits it." Thus Mr. Dickson finds that in a damp climate the flower, being rather full, is subject to damp in its outer petals. It is not, I think, a very quick grower, and I have more than once noticed that it takes three or four years to get established and clothe the Pillar. But when this is accomplished, by cutting in the laterals freely, and discarding old wood to encourage long growths, I have found it easy to keep the Pillar covered; and though, perhaps it is never showy, I find the nicely shaped and pointed flowers of sulphur-yellow with a deeper centre very homely and attractive. When a situation suits it and it is doing well, it flowers fairly freely and continuously and beyond being perhaps a little tender and rather slow in growth, has no bad qualities. The Pillar on which it is grown may be anything from 6 feet to 8 feet high.

Climbing Caroline Testout, H. T. (Chauvry, 1902) "Rose Annual" 1911, p. 32

Here my friends are unanimous that we have an easy Rose to grow, and it may be grown on a Pillar of any height from 6 or 7 to 10 or even 12 feet. It is generally regarded as a well fixed sport of extremely vigorous habit from the well known variety. Mr. Dickson, however, gives me the interesting information that it is not really a sport at all, but is a seedling closely resembling the dwarf variety, the difference being more accentuated in autumn. One of my correspondents mentions that it will frequently make shoots 20 feet long in a season. But it is well to remember that the taller the Pillar the more difficult it will be to keep the base well clothed.

With this Rose it is most important to prune well down the first year to make a good start, and in the subsequent annual pruning in the spring at least one shoot should be cut right down, all lateral shoots which have carried flowers being cut in to two or three eyes, and the long young growths shortened to different heights up the Pillar. Occasionally a certain amount of twining is practicable, and this will help the lower eyes to start into growth, but it must be done with care, or a breakage will result. Bending down for a month in spring may also be practised with advantage. It flowers freely into the autumn until stopped by frost, and its blooms are attractive in colour, and often better in form than on the dwarf plants. These are all good qualities, and it has no bad ones, unless it be thought a trifle too rampant. It is not much troubled by mildew, but sometimes black spot will attack it. Taken all round we may call it one of the best of this group. I think there are two forms of this variety.

Climbing Frau Karl Druschki, H. P., "Rose Annual," 1910, p. 23, and 1912, p. 92

I doubt if this sport has really become fixed, and Mr. Frank Cant evidently shares this doubt, for he says he does not know if he has ever seen a really climbing plant of this variety, and

Mr. C. E. Cant records that it frequently reverts to the type. But this is of no matter, for any strong plant of Frau Karl Druschki will suit our purpose and easily grow into a Pillar, which may be from 6 feet to 10 feet in height as we wish. It is an easy Rose to grow, but at the same time none too easy to retain as a good well clothed Pillar, from its inveterate desire to grow from the top and leave the base bare.

The general rules for pruning are the same as for Climbing Caroline Testout, but even greater precautions must be taken to fill up the base, sacrificing some of the top if necessary, and the old wood should be cut out with even greater freedom. Mr. Page-Roberts writes of it, "Height all right, but the breadth too thin." Like its parent, the long straggling shoots are difficult to control in autumn. This must be guarded against in pruning, remembering that unless great care is exercised a good Pillar of one year may become a leggy one next season. But it is worth a good deal of care, for a well grown Pillar of Frau Karl Druschki is most decorative, its glistening white flowers showing up from distant parts of the garden, while it blooms more or less all summer and autumn, and Mr. Courtney Page adds, "I think I might add winter too."

It is somewhat subject both to mildew and black spot late in the year, but there are many worse; and the former may be checked if taken in time, by the ordinary methods. Its good qualities are the excellence and showy character of the flowers, its bad one its liability to become bare at the base. Mr. Dickson suggests that even on a Pillar it is well to disbud the flowers from time to time.

Climbing Lady Ashtown, H. T. (F. M. Bradley, 1909)

This is a Rose in which a good deal seems to depend on the selection of a good plant; in other words it seems as though the climbing type were not quite fixed, and that many plants revert to the dwarf form. This also explains perhaps why one or two of my friends regard it as difficult to grow as a Pillar Rose. Given a good plant, however, it seems to do well on a

Pillar from 6 feet to 8 feet high. It is specially valuable for its autumn flowering which, as Mr. G. Burch notes, is very good. The bad quality of this Rose is that like the dwarf type it is easily attacked by mildew. Spray early and spray often therefore should be the rule. Pruning should be severe the first year, afterwards thin out old wood moderately and shorten the laterals, which may be retained so long as they are productive. The good qualities of this Rose are the fine shape and good solid pink colour of its flowers, and its good autumnal flowering.

Climbing La France, H. T. (Henderson, 1894)

It is somewhat of a surprise to me to find so much difference of opinion as to this Rose. Several of my friends regard it as difficult, and others, including myself, have found it grow rapidly into a good Pillar, while Dr. A. H. Williams regards it as the "best of the lot." Here, again, I think there is a certain amount of care required in the selection of the plant, because there is often a tendency to revert to the dwarf type. Mr. E. Doncaster, for instance, expresses this in other words by saying it is easy "if a vigorous plant." When you have got a good plant, however, let it alone; even the first year after planting prune very little if at all. After three or four years the laterals may be reduced annually. It is quite likely not to flower much for the first two or three years; Mr. Frank Cant notices it is most important to secure free root action, and Mr. Easlea lays stress on the fact that it must become well established before it will flower well. When this is attained, however, it often flowers better, if not more profusely, than do the dwarf plants, the flowers expanding more readily; and it is stated that on heavy soils some have discarded the dwarf plants in its favour. It is slightly subject to mildew and readily infected by black spot.

It will be noticed the treatment in pruning recommended for this Rose differs from that for the usual run of Roses of this type. Everyone knows the lovely flowers of this, the first of the

Hybrid Teas when they condescend to open for us in fine weather. Moreover, there are few more fragrant Roses than La France. Mr. Dickson thinks it worth growing as a Pillar "for its scent alone in the autumn garden."

Dawn, H. T. (Paul and Son, 1898)

This Rose is quite easy to grow, but I have felt some uncertainty as to including it in this list, for it should not be grown like the majority of the Roses here mentioned, but rather more as a specimen plant, the Pillar merely supporting the centre. If tied in too closely it may often refuse to break from the bottom, and then becomes woefully leggy, and when this state of affairs becomes established nothing seems to avail but digging it up and starting afresh with a new plant. Treated, however, as advised this should not occur, and its beautiful shiny pink flowers come freely in summer and fairly continuously, though more sparingly, later. Several of my friends consider the autumn flowering too sparse to be worth much consideration. Very little pruning is required, and that should be directed to the encouragement of young growths. Consequently thinning will be freely practised. It is somewhat, though not very liable to mildew, but suffers badly from black spot if that is anywhere near. This and its sparse flowering late in the year are its defects. Its good qualities lie in the decorative value of its glistening flowers, which are only semi-double, or nearly single, and in its vigorous growth.

Gustave Regis, H. T. (Pernet fils Ducher, 1890)

This is another Rose in which it is well to start with a strong, carefully selected plant, but for a different reason. There is no dwarf form here to which it may revert, but unless a strong plant is selected the growth will be disappointingly slow, and when once planted, save generous treatment, there is not much one can do to help it, for it resents hard pruning, and even the first year after planting light pruning should be the rule. Mrs. Weber says it sulks if pruned hard, and I have found it object

an old stump 20 feet high, but any height from this down to 7 feet or 8 feet will do.

It requires thinning out freely every year, as many as practicable of the shoots retained being allowed to stand their full length, or only shortened to the height desired, but a number must be further shortened to clothe the base; some of the weak shoots may be shortened or removed in summer to allow the rest to ripen. It flowers very freely in summer, and well, if not so freely in autumn, and has a very long season, often flowering till Christmas, while Miss B. H. Langton says she might even call it a winter Rose, having frequently gathered blossoms in January. The flowers are creamy white, with a blush centre, and open well both in summer and autumn. Mr. Dickson says the later flowers open better if thinned out with a small pair of scissors. The late autumnal flowering is better if the long shoots are allowed to hang over and not tied in to the Pillar.

The foliage is of a lightish green and very good, lasting long on the plant. It is comparatively free from mildew, only one of my friends having found it suffer much; and it is not naturally subject to black spot, though I have known it to suffer if it has come within a region of infection. Its worst fault as a Pillar Rose is that, if not correctly pruned, it is liable to make a dense growth which hides the flowers. I rather think it has seldom done so well with me as one year when the pruner inadvertently removed the whole of the centre of the main growth of the Pillar.

Morgenroth, H. T. (P. Lambert, 1903)

Most of my friends, and I myself, consider this easy to grow as a Pillar from 6 feet to 10 feet high, only one thinks it difficult, but others would prefer it as a bush or specimen plant. The latter view perhaps indicates its treatment. It throws up well from the base, and should receive careful and rather thorough thinning, and fairly hard pruning. It is a good bright colour, resembling Carmine Pillar, but being perpetual, flowers again after its summer blooming. During the latter part of

the season it is seldom without flowers, but never again is so fully covered as at its first flowering.

Some of my friends think that both it and Sheila Wilson are scarcely wanted, and that if one is grown the other need not be. Personally, I have both, and would not at present discard either. The autumn flowers are not so bright as the summer ones, but they are bright and useful even in autumn. If allowed to become too rampant the autumnal flowering is apt to suffer. It keeps its foliage well and I have few complaints of mildew, but one or two of black spot. Being single, the flowers open readily, even late in the year.

Papillon, T. (Nabonnand, 1882)

This Rose is quite easy to grow on an 8 foot or 9 foot Pillar. I incline to think I should call it the best Tea Rose we possess for this purpose. It so readily clothes itself right up from the base and allows, according to my experience, much latitude in pruning. Most of my friends consider it should only receive slight pruning, and it does well, undoubtedly, when so treated but I think I get even better results when, as I do every few years, I prune it rather drastically.

I should warn my readers to be careful if they wish for success, to see they get a strong plant. The first plant I had of this variety absolutely refused to grow more than about 3 feet and it still remains about that height, though I have had it undisturbed for some ten years, and retain it as an object lesson. On getting a strong plant, however, I found it would readily make a 15-foot Pillar, though this was higher than I wanted it.

It is extremely free flowering all the season through, and the flowers, which are borne in large trusses, are very fresh and decorative, particularly if picked young. They are pink and white, with a coppery shading. They are wanting in form it is true, but I think this is the only bad quality my friends have been able to find in this Rose as a Pillar.

Paul's Single White, H. P. (Paul and Son, 1883)

There can be no question that this is an easy Rose to grow. Mr. Dickson calls it of extraordinary vigour and hardiness, requiring abundant room, the most vigorous Rose he knows, but perhaps it may be admitted that, though not a bad Pillar Rose, it is not altogether an easy Rose to grow in this fashion, on account of its long, rather straggling growth. I notice several of my friends regard it as out of date, but I know not what I could well substitute for it with advantage.

It flowers well and freely summer and autumn, and its pure white flowers are very pleasing. Moreover, it opens freely in any weather, and in a wet year is particularly useful. It has good rather light green foliage which is practically free from mildew, but sometimes touched by black spot, and the plant makes long lax laterals, which flower late into autumn, and altogether the growth is clean and satisfactory.

There is generally a good deal of thinning to be done at pruning time, and laterals that have flowered may be closely cut back. Almost its only fault is that it is rather too vigorous, a fault at least on the right side.

Reine Olga de Wurtemberg, H. T. (Nabonnand, 1881), "Rose Annual," 1911, p. 50

This Rose, which is said to be partly derived from the American Wild Rose *setigera*, is very free and hardy, and easy to grow on a Pillar from 8 feet to 10 feet high. The foliage is very good, nearly evergreen, and little subject to disease. It flowers well in summer, and again in autumn, and though the latter is not so profuse as the former it usually gives enough flowers for the autumn Show, if we want them. The bright crimson flowers have a certain carmine tint, which becomes more accentuated later in the year. In habit of growth it is not unlike the last, but not so unruly. It should have a certain amount of thinning, but it may be remembered that it will flower on spurs from the old wood; the long growths will have very little pruning, but the weak laterals must be cut hard back. It is fairly free though not exempt from mildew and other diseases.

Sheila Wilson, H. T. (Dr. J. C. Hall, 1910)

A good plant of this Rose is easy to grow on an 8-foot Pillar. I notice one or two of my friends have suggested a lower Pillar, 5 feet or 6 feet, and one states that with him it has refused to grow more than 3 feet. With me it took a couple of years before it made a good start, but is now at the top of an 8-foot Pillar. When once established it seems fairly free, continuous, and good throughout the season, being a perpetual "Carmine Pillar" with nearly single flowers of a light soft crimson or carmine crimson. Some think it a slightly better shade of colour than Morgenroth, but in many respects no doubt it is very like it. A special feature of this Rose is the quantity of large orange scarlet hips it produces in autumn, which look very bright and cheerful through the winter.

It is evidently of importance to select a good plant and treat it generously at the start. Except perhaps the first year after planting it should receive practically no pruning till well established and making good shoots. When this is attained thin out freely and cut back where necessary to form a good Pillar. It is fairly free from mildew and other diseases, but one of my friends has found it to suffer from black spot. Some of them regard it as the best crimson Pillar Rose among the single flowered varieties down to the present, and it is very striking when flowering well.

William Allen Richardson, N. (Yeuye Ducher, 1878)

This Rose is easy to grow, particularly where there is some shelter, but perhaps rather difficult to form into a good Pillar, and doubtless for this reason some two or three of my friends do not approve it. Mr. Easlea tells me there are two forms on the market, and that for our purpose it is of importance to secure the true climbing form. I think the best way to treat this Rose, after the first year, is to let it grow as it will for a time, when it will form a bushy growth, and then begin gradually to train in and build up the Pillar, pruning in the laterals rather late in the season. If they are pruned too early, and the buds start too soon, they may be found lacking in colour.

This Rose is sadly wanting in form of flower, but its great asset is its striking orange yellow flowers, which are still unique among climbing Roses, and it has good and lasting foliage. This is not very subject to mildew when grown as a Pillar, not nearly so much so as when on a wall but some of my friends complain of canker occasionally. Late in autumn, and sometimes in very hot weather, the flowers are apt to lose their colour, as in the case with many of our yellow Roses, and in the North I find some complaints of lack of robustness. I think this seldom occurs in the South or Midlands. These and its tendency to form a bush, are its worst qualities as a Pillar Rose.

The Lasting Qualities of Cut Roses

By George Laing Paul



N RE-READING Mrs. Darlington's excellent paper on Cut Roses and their lasting qualities in last year's *Rose Annual*, one is led to consider why certain kinds are so much preferred for florist purposes and why indoor flowers are so much used; and so, in studying Roses with a view to their lasting qualities, one naturally turns to the florist for information. The Roses which are seen in the London shops consist of a few varieties only, and these are evidently the kinds which can be profitably grown and successfully marketed as cut flowers. A well known Scotch gardener recently told me that he had for years sent up to London for the decoration of the town house cut Roses which he had grown under glass; but that when he tried to do the same thing with Roses grown out of doors he was not successful, and he attributed this difference to the softer or, so to speak, more herbaceous growths of the indoor blooms.

Now this is precisely what those florists find who grow large quantities of cut Roses for the London and other markets. The best and most lasting flowers are produced by those varieties which will absorb most liquid and grow most rapidly and continuously; kinds like Mme. Abel Chatenay are even sent as far as Paris, where they fetch very high prices. In America, where it is said that in the winter the morning sun will send up the temperature some 30 degrees in an hour, it has proved possible to grow fine flowers of varieties such as American Beauty, which are comparative failures in our more sunless climate. Our growth is not so rapid and the absorption of water consequently not so great.

Such experiences, gained under well defined conditions, indi-

cate the great importance in the preparations of Rose beds, of providing for a constant supply of moisture. We cannot so well control out of doors, as under glass, the conditions under which our Roses grow, but we can at least see that, the drainage being adequate, the subsoil is sufficiently retentive to provide moisture at all times to the young feeding roots. Examination of the prize blooms at any important Rose exhibition will show that the stems, though strong and healthy, are by no means very woody. They are easily cut with a knife and contain a considerable proportion of pith. Even the largest bunches of the wichuraianas are borne upon wood of a sappy nature. Roses, like other plants, assimilate the food they take from the soil in a liquid form, and so the best blooms are found upon growths containing much moisture. The modern Rose, with its continuous growth and perpetual flowering qualities, needs constant feeding, but in a different fashion to that of bygone days. Thus a proper supply of nitrates becomes more and more essential, whilst Rosarians are rapidly coming round to the opinion that there is need for caution in the use of potash if fine flowers are to be obtained. I have not studied this point closely, but seek rather for information. There is here a wide field for the chemist and scientific Rosarian.

I dare not follow Mrs. Darlington on the question of colour or colours. Undoubtedly some of the yellows deepen in colour if kept in water some time. Mme. Hoste is kept in a dark cupboard by the florist, and thus becomes much deeper in colour. The question of yellow Roses, however, is an exceptional one, for there are two classes. Some of the kinds come a deeper and better colour in hot sunny weather, whilst others require a cool, shady climate to obtain perfection. The Lyons Rose, Sunburst, and the Marechal Niel family are instances of the former, whilst Mme. Ravary is the most striking example of the latter.

Roses should be put into water immediately they are cut and the water should not be too cold, the chill being taken off. If they can then be kept some little time in a dull place before using them, they will be found to last longer and to open much fresher.

New Species of Rosa

By W. Dallimore



N COMMON with many other genera, as the result of explorations in China and other countries, the genus *Rosa* has received numerous additions during the last fifteen or twenty years, but it is possible that these new Roses have attracted attention more slowly than other shrubs by reason or the fact that the several types of Garden Roses very largely supplant the species in the estimation of the general Rose-growing fraternity.

The species of *Rosa*, however, have quite as great claims upon our attention as other kinds of shrubs, for they are available for the same purposes, and are no more difficult to manage. Although usually disregarded in shrubbery planting, many species of *Rosa* are well suited for this purpose, for not only are they beautiful when in flower, but many of them bear exceedingly attractive fruit. There are also places in the Rose Garden where certain species can be planted with advantage, for it is difficult to imagine a more lovely effect than that produced by a well grown and well flowered example of *R. moschata* clambering over an old holly, or a mass of *R. lutea*, *R. spinosissima* or *R. rugosa* in a suitable position. Moreover, many of the species are excellent as specimen bushes or for arranging as informal groups in the wilder parts of the garden. With this in view the following notes have been prepared for the purpose of directing attention to a few of the more promising of the new kinds.

R. GIRALDII is a Chinese species which was introduced into this country from the Arnold Arboretum about 1908. Of vigorous habit, it is attractive by reason of its rosy red, white centred flowers, which are as much as $1\frac{3}{4}$ inches across, borne in

large, loose inflorescences, and by its masses of oblong scarlet fruits which hang for a considerable time during late summer and early autumn. The young shoots are reddish and thickly clothed with prickles.

R. HUGONIS was introduced in 1899, seeds being sent to Kew in that year by Father Hugh Scallan from Western China. It is a very charming plant, for it has a free and graceful habit, and



ROSA MOSCHATA

bears a profusion of bright yellow flowers about 2 inches across in April and early May. These are single flowers terminating short axillary shoots which spring from the branches of the previous year. Growing about 8 feet high, it produces rather small leaves, which average about 3 inches in length and are made up of from five to eleven leaflets. Two forms appear to be in cultivation, one of rather denser habit and less free in flowering than the other.

R. MOYESII. This is one of the most distinct of Messrs. Veitch's introductions from Western China. Seeds were sent to Messrs. Veitch by Mr. Wilson in 1903 and flowering plants were exhibited five years later. In a state of nature it is found growing from 5 to 10 feet in height, and it grows fairly strongly here. Its chief attractions are its deep terra-cotta red flowers, which are 2 inches to $2\frac{1}{2}$ inches across, and its red fruits. The leaves grow 6 inches long and the leaflets vary in number from seven to thirteen. Seeing that it grows naturally up to an elevation of 9,000 feet it ought to thrive throughout the British Isles.

R. NIPPONENSIS was introduced from Japan about twenty years ago. Forming a bush from $\frac{1}{2}$ foot to 7 feet high, it is chiefly remarkable for its solitary red flowers, which are from $1\frac{1}{2}$ inches to $1\frac{3}{4}$ inches across, and for its rich red fruits, each one being about $\frac{3}{4}$ inch in length.

R. OMEIENSIS. This is another of Wilson's introductions, seeds being sent to Messrs. Veitch from China in 1901. The specific name is taken from Mount Omi in Szechuen, the place where the species was originally discovered by the Rev. E. Faber. It is a strong growing bush 10 feet or more high, with rather small leaves, the largest being little more than 4 inches long, but made up of many leaflets, sometimes as many as 19, but usually less than 13. The solitary flowers are white with four petals, and usually well under 2 inches in diameter. The fruit is red when ripe, with yellowish stalks. It is allied to *R. sericea*, and is figured in the *Botanical Magazine*, t. 8471.

R. SERICEA VAR. PTERACANTHA. Although *R. sericea* is an old and well known species, several distinct forms have been introduced from China within recent years. Of these the variety *pteracantha*, which was made known to European gardens some ten or twelve years ago through the agency of M. Vilmorin, is the most distinct. It bears the familiar cream coloured four-petaled flowers of the type, with the same red or

orange-red fruit, but differs from the type in the large bright red fleshy, almost transparent spines which clothe the young shoots. The colour of these fades towards the end of summer, and in year old branches has turned to a greyish brown, while the texture has become woody. The more luscious the growth the better are the spines.

R. SERTATA. In 1907 seeds of this species were sent home by Mr. Wilson from Central China, and plants flowered some



ROSA TOMENTOSA

three years later. It is of moderate growth, mature bushes being about 5 feet or 6 feet high, and of graceful outline. The flowers are borne a few together, or solitary, on short twigs from axillary buds. They are purplish-rose in colour and measure up to $2\frac{1}{2}$ inches across. The fruits are deep red and $\frac{3}{4}$ inch long. It promises to be a very useful kind. A figure of it is given in the *Botanical Magazine*, t. 8473.

R. SETIPODA. This plant grows 8 feet or 10 feet high under cultivation, and produces rather large leaves as much as 7 inches long. The flowers are purplish-rose in colour, upwards of 2 inches across, and are borne in terminal clusters. The fruits are about an inch long and bright red in colour. It bears some resemblance to the Himalayan and Chinese Rose, *R. macrophylla*, and is a native of Hupeh, in China. Introduced by Messrs. Veitch, it first flowered in their Coombe Wood Nursery in 1909. In upland thickets in Western Hupeh it is said sometimes to grow 20 feet high.



ROSA DUPONTII

R. SOULIEANA. M. Maurice de Vilmorin introduced this Chinese species to cultivation rather more than twenty years ago. It is a very strong growing plant of the *R. moschata* type, attaining more than 12 feet in height, with a dense habit, intensely spiny shoots, and rather glaucous leaves, which are 3 inches or 4 inches long. The creamy white flowers each about $1\frac{1}{2}$ inches in diameter, are borne in large clusters in July, and

are succeeded by orange coloured fruits. It is an excellent kind for the wild garden.

R. WILLMOTTIAE. This promises to be a useful shrub, and is rather near *R. sertata* in appearance, but smaller in all its parts, growing 8 feet or 10 feet high. It has a graceful habit, with



ROSA ARVENSIS

greyish branches, small leaves and solitary purplish-rose flowers, which may attain $1\frac{1}{2}$ inches across. The roundish fruits are red in colour. It is a native of Western China, and was introduced by Messrs. Veitch from seeds which were collected in the Nim Valley at between 7,500 and 9,500 feet elevation.

Rugosa Roses

By H. R. Darlington, Secretary N. R. S.



THE Rugosa Roses, also known as the Ramanas or Japanese Roses, form a very interesting group, but perhaps have scarcely attained the popularity that their merits deserve. Yet for certain purposes they are well worth the attention of rosarians. They are wonderfully hardy growing and flowering freely in the most exposed situations, even close to the sea. They are attractive alike in their strong, handsome foliage, their delightfully fragrant flowers, and, most of them also, in their large, brightly coloured fruits. They vary considerably in habit of growth, some forming neat bushes about 3 feet high and 2 feet or more across, while others if allowed will form huge shrubs 12 feet to 15 feet in stature, and there are sorts of intermediate sizes, the majority naturally growing into well shaped bushes 5 feet or 6 feet in height. There are two of them, *rugosa repens alba* and *rugosa repens rosea*, of a climbing or creeping habit of growth, which, if given sufficient room, grow into great masses 4 feet to 6 feet high and 20 feet or more through; thus it will be seen they afford plenty of choice when the purpose for which they are wanted has been decided upon. In the whole Rose family there are none which as a group make more easily managed or better hedges, and it is for this purpose, or for growing as free bushes, either in isolated positions or in an open shrubbery, that they are more peculiarly adapted.

The perfume of the flowers is very sweet throughout the whole group, and in those, such as Rose a Parvum de l'Hay, to which the damask scent is added, we get flowers which are perhaps the most fragrant of all Roses. In addition to these advantages the Rugosas are as a group comparatively free

from disease, and they are perpetual, that is to say they flower a second time in autumn, and some will be found in flower practically the summer through.

On the other hand they have certain, and rather decided limitations. They do not in any way take the place of our ordinary garden Roses, such as the H.T.'s and Tea Roses, as occupants of our beds and Rose border. Their petals are frequently apt to be somewhat floppy, and the flowers do not really last well when cut and placed in water, consequently they are seldom seen at out shows, and only a few of them are of much value for the decoration of the house. While the single flowered kinds are often very beautiful, the double forms that have been obtained hitherto are for the most part of rather poor quality in the matter of form. There are a few exceptions. Conrad F. Meyer and its white sport Nova Zembla are usually well shaped, frequently also Daniel Lesseuer, Mme. Georges Bruant, Mme. Lucien Willeminot and Messrs. Paul and Sons' most recent addition to the group, Dolly Varden. But taking the double members of the Rugosas all round beauty of form is not their strong point.

The majority are essentially outdoor plant, and perhaps in considering their place in the garden we ought to think of them rather as flowering shrubs than in the light we usually regard our garden Roses. This applies also to our pruning of them, and in this respect they are decidedly accommodating, for they will do very well with practically no pruning at all, merely having the old wood removed every three or four years when the bush begins to become too dense, or if preferred, and the position they occupy seems to require it, they may be pruned either moderately or even rather hard each spring. It is usual to do what pruning is required during February, and it is certainly convenient to get their pruning finished before the bulk of our garden Roses require attention, but it may really be taken in hand in any spell of open weather during autumn or winter, for they are so hardy that there is little fear of the Rugosa suffering from frost by reason of the pruning being carried out too early.

History

The history of the Rugosas bears some resemblance to that of the hybrids of *R. multiflora*, in the sense that something like a hundred years elapsed after the discovery of the species before their development as garden plants was at all seriously taken in hand.

R. rugosa rubra and also the white form *R. rugosa alba* are generally attributed to the Swedish botanist and traveller Carl Pehr Thunberg, under the year 1784, in which he published his *Flora Japonica*. It seems however, possible that this Rose was introduced even earlier than this, under the name *R. kamtchatica*. The early history of these Roses rests in some obscurity, but is not without interest and deserves a short notice.

In the year VIII of the Republic (1800) Ventenat, the gardener of the Empress Josephine, published his *Description of the Plants Cultivated in the Garden of J. M. Cels*, wherein he described *R. kamtchatica* and gave a fine plate of it drawn by Redoute. Later in 1817 and 1824, Thory and Redoute gave another picture of the same plant and it had also been figured by Andrews in 1805. Now, looking at these pictures, though there are certain differences between the portraits of Redoute, which Thory attributed to the effect of some eighteen years' cultivation, there can be little doubt that we have a plant of *R. rugosa* and nothing else, and in his *Prodromus* (1820) Thory expressly calls *R. rugosa* a synonym of Ventenat's *R. kamtchatica* and also of the *R. ferox* of Andrews.

Lindley in his *Monograph* (1820) sets out first the *R. ferox* of Andrews, confusing it with Marschall von Bieberstein's plant of the same name, which comes from the Caucasus, not from Japan, and is a member of the Sweetbriar group; next *R. rugosa*, which he had not seen and knew only from Thunberg's description, and which, as he says, contains little to distinguish it from *R. ferox* and *R. kamtchatica*, and he gives a Japanese drawing of this Rose. And thirdly he gives *R. kamtchatica* itself, distinguishing it chiefly by its growth and the supposed possession of falcate thorns under the stipules.

Now there can be little doubt that Andrews' *R. ferox* is simply *R. rugosa*; Andrews himself says Willdenow's description of *R. rugosa* is meant for his *ferox*, as it accords with his figure. He adds that it seems by nature formed to be admired at a distance from the numerous large thorns with which the stem is surrounded. But what was Lindley's *R. kamtschatica*? Professor Crepin investigated the question and came to the conclusion that it and *R. rugosa* were only two forms of the same specific type, a conclusion in which, after going through the evidence available (which it would take too long to set out here), I have also arrived, with the proviso that *kamtschatica* may be a hybrid form.

The interest of the enquiry lies in this: that Lindley tells us that *R. kamtschatica* had usually been considered of somewhat recent introduction to the gardens of Europe; but that it was certain that the period of its arrival might be fixed at somewhat beyond the middle of the seventeenth century. Sir James Smith possessed a specimen of it gathered in the Botanic Garden at Chelsea in 1791, but to M. Ventenat must be given the credit of having first made it known. Moreover, in the *Botanical Register*, vol. 5, where figures are given of both *R. kamtschatica* and *rugosa*, it is stated that *kamtschatica* was brought out by Cels in 1802 and *rugosa* by Lee and Kennedy in 1796. These dates may be accepted as the dates of their issue to the public.

But although these Roses were introduced so long ago, the greater part of the eighteenth century was to elapse before they obtained a footing in our gardens. In 1873 MM. Jamain and Forney state that they are too new to pronounce a definite judgment upon. *The Garden* for May, 1876, contains a reference to the white form, *rugosa alba*, and in 1880 a note from Lord Brownlow's gardener in *The Gardener's Chronicle* shows that he was then growing the rugosas. Otherwise we hear little of them. About this time the hybridizers seem to have turned their attention to the group for Mrs. George's Bruant, one of the first of the modern hybrids, appeared in 1887, and in 1889 Dr. Mueller, working, I believe, in conjunction with M.

Jules Gravereaux, brought out Thusnelda. Thenceforward these raisers, together with Messrs. Paul and Son, Cochet-Cochet and others, produced a great many varieties.

Besides the named garden varieties *R. rugosa* has formed, either naturally or artificially, a number of crosses with various other species, several of which are of considerable interest, though for the most part they have not been distinguished by garden names. I have accordingly arranged the list of the group which follows in two classes, first, the named garden forms; and, secondly, the hybrids with other species. This arrangement must be considered to be for convenience only, and to carry no special significance with it, for of course the garden varieties to which particular names have been applied are themselves of hybrid origin, having generally been raised by crossings with some garden derivative of *R. indica*.

Selection

To those of our friends who are beginning to grow these Roses I am disposed to commend the following selection:

SINGLES.

Alba, *atropurpurea*, *calocarpa* and, perhaps, for its perfume, *Souvenir de Pierre Leperdrieux*.

SEMI-DOUBLE.

Blanc Double de Coubert, *delicata*, *fimbriata*, *Thusnelda* and *Mrs. Anthony Waterer*.

DOUBLE.

Conrad F. Meyer, *Mme. Georges Bruant* and *Nova Zembla*.

I have grown all the varieties named in these lists in my own garden except where the contrary is stated.

Rosa rugosa

ALBA (Thunberg, 1784?). This has large single white flowers followed by round fruits. The plant is moderate in growth, forming a bush from 4 feet to 6 feet high. It is a very lovely flower and a great favourite with me; the petals are a pure white and contrast well with the yellow anthers.

AMELIE GRAVEREAUX (Gravereaux, 1904). This is a strong grower of upright habit, making a bush 6 feet to 8 feet high if unpruned, with large flowers rather more than semi-double of a deep purple red color, one of the best of its particular type.

AMERICA (Paul and Son, 1895). The flowers are large and open and of a crimson lake colour. The shape is that sometimes called the American shape, which differs slightly from the true Japanese. It has large ovate fruit covered with long spines. Mr. G. L. Paul tells me that this Rose was sent to his firm in the year 1892 by Professor Sargent, of the Arnold Arboretum U. S. A. It has proved with me to be one of the earliest to flower in the section.

ATROPURPUREA (Paul and Son, 1899). This has deep blackish crimson buds opening to maroon flowers, changing to purple as they fade. It is a most beautiful variety; perhaps the greatest advance yet attained in the singles. The berries which follow the flowers are rounded and slightly flattened. The plant is of moderate growth, from 3 feet to 5 feet high, and tolerably bushy.

BELLE POITEVINE (Bruant, 1894) has long buds and semi-double rose-coloured flowers. It is a strong grower of upright habit, and will make a bush 6 feet to 8 feet high.

BIENYETU (Gravereaux, 1906). This variety is double, but not full, the colour pink with a touch of salmon when fresh, but the form in the flower is poor. Left to itself the plant makes a bush of a nice rounded shape about 4 feet high and 7 feet or so across, the growth being spreading rather than upright. The foliage is good. It is said to be a cross between a seedling from Pierre Notting and Safrano with Conrad F. Meyer. (*Rev. Hort.*, 1st March, 1907.)

BLANC DOUBLE DE COUBERT (Cochet-Cochet, 1892). This has pure white semi-double flowers, which it produces freely and constantly, so that in the autumn flowers and fruit may

be seen on the plant at the same time. The fruits are large and a good scarlet colour. The flowers are noticeable for their fragrance, even among a fragrant family. It is a fairly strong grower, forming a bush from 5 feet to 7 feet high of a good shape. This is the best double white and quite one of the best of the group. It was derived from the Tea Rose Sombreuil crossed with *rugosa*.

CALOCARPA (Bruant, 1895). The flowers are single and rosy pink in colour. The fruits are produced abundantly and are a bright scarlet and shiny. They are not quite so large as in some varieties, and are pendulous. This plant is a strong grower, reaching from 6 feet to 8 feet if unpruned; it appears to be one of the most commonly grown. It was obtained from *R. rugosa* × Common China.

CARMEN (Lambert, 1906). This has bright crimson flowers with golden anthers, which are very fragrant. The blossoms are single and very freely and continuously produced, but it forms no bright coloured fruit. Sometimes there are a few green ones. It is of good habit and moderate growth, the bush being about 4 feet or 5 feet high. It looks very well in the garden when in flower, for it is perhaps the best colour among the crimsons.

CHEDANE GUINOISSEAU (Guinoisseau, 1895) has deep rose coloured double flowers, followed by berries in autumn; it is fragrant and continuous.

COMTE D'EPREMESNIL (Nabonnand, 1892) has double flowers of a deep reddish violet, not one of the most attractive. It is a strong grower and will reach 7 feet or more if unpruned.

CONRAD F. MEYER (Muller, 1899; Froebel, 1900). This is a very strong grower, often sending out shoots 8 feet and 10 feet long. The flowers are full and the best shaped of the group, clear, silvery rose in colour, fragrant and continuously produced.

If allowed to grow as it will, it forms an enormous shrub of upright habit, but it also does well trained as a hedge or grown on a wall. It is sometimes described as a seedling from Mme. Gabriel Luizet, but it seems that it was, in fact, obtained by crossing an unnamed seedling from Gloire de Dijon \times Duc de Rohan with the *rugosa* var. *Germanica* (see *Journal R. H. S.*, vol. 30, p. 451). It generally gives us the first well shaped double Rose in the garden towards the end of May. Everyone should grow it.

DANIEL LESSUEUR (Cochet, 1908). This is another strong grower, with full double flowers of large size and often well shaped, of a nankeen yellow colour, the buds shaded coppery pink, a new colour in this group. It forms berries freely, but most of them remain green; only a few turn red. From the habit of growth one would imagine it related to the Dijon Teas, but it is said to have been derived from the cross Pierre Notting \times Safrano \times *rugosa*. I find it best to peg this Rose down. It is too straggling to make a good bush.

DELICATA (Cooling and Sons, 1898). This has soft, rose pink flowers, freely produced. The petals are large and a pleasing colour when fresh. It is one of the best. It is a fairly strong grower and makes a big bush if left alone. There is a large specimen at Kew between the rock garden and the glass houses.

DOLLY VARDEN (Paul and Son, 1914). This is the latest addition to our group and it is welcome. The flower is semi-double, of a soft peach pink colour, with orange pink buds, the petals are rather longer, and the buds more pointed than is the case with most of the *Rugosas*, and the flower is often prettily shaped. Its growth is of quite manageable dimensions, and it will form a neat bush when grown from 3 feet to 4 feet high. Approaching as it does the Hybrid Teas, I think it is desirable to give Dolly Varden a certain amount of pruning in the spring, though this need not be severe unless the position requires it.

FIMBRIATA (Morlet, 1891). This is a very pretty variety. The flowers are white tinted and edged blush, and are remarkable in having the margins of the petals fringed or serrated, rather like a pink. The flowers are single. The growth is moderate, and it forms a bush about 4 feet high. It is the result of a cross between Mme. Alfred Carriere and *R. rugosa*.

GERMANICA (Muller, Gravereaux, 1890). This variety has single Rose coloured flowers. It is of moderate growth, making a bush 3 feet or 4 feet in height. The chief interest of this plant, for the possession of which I am indebted to the kindness of M. Jules Gravereaux, lies in its having been the parent of Conrad F. Meyer and some other members of the group. Dr. Muller seems to have brought out another Rose of the same name in the year 1900, which I have not seen.

HELVETIA (Froebel, 1897) has white flowers carried in trusses, single or nearly so, succeeded by bright coral berries. The foliage is curious in having a hoary appearance.

HIMALAYENSIS, synonymous with *R. rugosa* fl. pl.

HILDENBRANDSECK (Lambert, 1909). This plant makes a very pleasing bush or a bushy pillar up to 8 feet high. Its flowers are a silvery rose and produced quite continuously the summer through. It makes no red berries.

KAMTCHATICA (Cels, 1802). I have already mentioned this Rose, and pointed out that the plant drawn by Redoute in Les Roses under this name is simply *rugosa*, while that drawn by the same artist and described by Ventenat in the Jardin de Cels is different, having fewer and more hooked thorns. *R. kamtchatica* is shown in a coloured plate in the *Botanical Register*, vol. 5, p. 419, with one falcate thorn under each stipule and densely covered with setae but no other thorns; otherwise it is like *R. rugosa*, with the typical dull rose coloured flower. It is also figured in the *Botanical Magazine*, vol. 59, where more thorns are shown. These plates follow Lindley's

description, who I fancy had only seen dried specimens. I have for some years grown a plant of this Rose, which corresponds fairly well with that in the *Botanical Magazine*, but is quite unlike that in the *Botanical Register*. It has reddish stems and has all the appearance of a hybrid *rugosa*. There is a thorn larger than the average under each stipule, which is sometimes falcate, but nearly as often straight.

LE CID (Vigneron, 1906). I have found this Rose somewhat disappointing. It is described as bright crimson, but the flowers borne by my plant have been a dull reddish rose, semi-double. It has not developed proper berries. The parentage is given as Conrad F. Meyer \times Belle Poitevine.

MADAME ALVAREZ DEL CAMPO (Gravereaux, 1906), has large buds and flowers, rosy flesh tinted salmon. Of the many varieties of *rugosa* I have tried as pillar Roses this is one of the few I have retained in this form.

MADAME ANCELOT (Gravereaux, 1906). This has large double flowers, flesh pink with lighter reflexes. It is a very big grower, and in good soil attained some 10 feet or 12 feet in height. Not finding the flowers very attractive I moved it to a shrubbery border, where it has proved more manageable. Its parentage is given as Reine des Iles Bourbon \times Marechal Niel \times Perle des Jardins \times *rugosa* Germanica.

MADAME BALLU (Gravereaux, 1915), a soft rose pink, a pretty colour but poor shape. It is a strong grower reaching 6 feet to 8 feet in height.

MADAME CHARLES F. WORTH (Schwartz, 1890). This has double carmine coloured flowers carried in large bunches. It is a vigorous grower and makes a good bush some 5 feet or 6 feet high.

MADAME GEORGES BRUANT (Bruant, 1887). This is a double white variety, nearly full, and often comes a fair shape.

It comes into flower a little later than Blanc double de Coubert, and though of better form is not so showy in the garden, nor is it quite so pure a white. It is said to have the same parentage as this Rose, i.e., the Tea Rose Sombreuil crossed with the *rugosa* of Thunberg, but while Blanc double de Coubert is nearer to the typical *R. rugosa* Mme. Georges Bruant partakes more of the Hybrid Teas (see *Journal R. H. S.*, vol. 29, p. 42). Both varieties have much the same vigor of growth 5 feet to 7 feet.

MADAME HENRI GRAVEREAUX (Gravereaux, 1905). A rather large double cream coloured flower with a pink centre. A strong grower, said to be derived from Marie Zahn (H. T.) × Conrad F. Meyer.

MADAME JULIEN POTIN (Gravereaux, 1912). This is a recent addition to the group, and has double flowers of a pretty carnation pink colour, but appears inclined to suffer somewhat from mildew. I have, however, only had it for one year in my garden.

MADAME LABORIE (Gravereaux, 1905) has bright pink double flowers and nice buds. The parentage given is General Jacqueminot × Emperor de Maroc × Conrad F. Meyer, but it has little resemblance to the two first named Roses.

MADAME LUCIEN WILLEMINOT (Gravereaux, 1905). This has double flowers nearly full and often a fair shape, of a soft salmon rose colour. It is stated in *The Garden* for 1911, p. 338, that this Rose came from Conrad F. Meyer × Safrano, but Mr. G. M. Taylor has kindly informed me that on the authority of Dr. Muller the second parent should be Belle Poitevine. In habit of growth it much resembles Conrad F. Meyer, but the flowers are not quite so full, softer in colour, and I think slightly more continuously produced. It is rather a favourite with me.

MADAME RENEE GRAVEREAUX (Gravereaux, 1906) has soft pink cup-shaped flowers, and arose from a cross between Conrad F. Meyer and Safrono (see *Rev. Hort.*, 1st March, 1907).

MADAME TIRET (Gravereaux, 1907) has carmine centre and pale pink outside to the petals. It is a big grower with nice brownish wood. From a seedling between Pierre Notting and Cardinal Pattriyi crossed with the *rugosa* Germanica (*Le Jardin*, vol. 21, p. 355).

MADELINE FILOT (Gravereaux, 1907). A double flower, pink with rose reflexes, from a seedling between Reine des Iles Bourbon and Perle des Jardin crossed with the *rugosa* Germanica (*Le Jardin*, vol. 21 p. 355).

MERCEDES (Guillot, 1900). This is a very pretty flower in colour, which is a soft carnation pink on a white ground, and double. It is stated to be very hardy and vigorous, but curiously enough it is the only *rugosa* I have ever had that has not done well with me. My plant has never grown more than about 2 feet in height, with a slightly spreading habit. I shall have to make a new start with another plant.

MRS. ANTHONY WATERER (Waterer, 1897). This has deep crimson carmine semi-double flowers, which are quite remarkable for their fragrance, which at times will scent the air around the plant. It is a moderate grower of slightly spreading habit, making a wide bush 3 feet or 4 feet high. It is said to come from the cross General Jacqueminot \times a hybrid *rugosa*, and is one of the best of the group, but I do not remember seeing any berries on the plant.

NOVA ZEMBLA (H. W. Mees, 1906), a white sport of Conrad F. Meyer, which it resembles both in habit of growth and in the form of the flower, which is generally well shaped. Like most white sports the colour of the flowers is apt to vary

somewhat. I have thought that in recent years they have been a better white than they used to be when my plant was young.

REGELIANA appears to be synonymous with *rugosa rubra*.

REPENS ALBA (Paul and Son, 1903). This has white flowers and long, creeping, flexuous, but stout stems, which will in course of time form a huge, impenetrable bush, 4 feet to 6 feet high and of great width. It was obtained by crossing *rugosa* with *wichuraiana* (*The Garden*, 1910, p. 979).

REPENS ROSEA is similar to the last, but has large deep rose flowers, also single.

ROSE A PARFUM DE L'HAY (Gravereaux, 1904). This has large full double flowers of a dark carmine crimson, not usually well shaped, though one occasionally comes across a nice flower, but so fragrant that this Rose was selected by M. Jules Gravereaux, as the most highly scented of all Roses, for the purpose of making perfume. It is the result of a cross from an unnamed seedling from General Jacqueminot \times *R. damascena* with var. *Germanica* (*Journal R. H. S.*, vol. 30, p. 451).

ROSE APPLES (Paul and Son, 1896). A plant of good habit, about 5 feet with pale rose flowers and large berries freely produced. A capital hedge plant.

ROSERAIE DE L'HAY (Cochet-Cochet, 1902) has dark red flowers, freely produced. It is a strong grower.

RUBRA (Lee and Kennedy, 1796). This is Thunberg's type. It has single reddish violet flowers of a rather ugly shade of colour, followed by bright fruits of good size. It appears to be synonymous with *Regeliana*, at least for garden purposes.

SCHNEEZWERG (Lambert, 1911). This is a beautiful little semi-double flower of a very pure white, freely produced. I have not noticed any berries. It is said to be a hybrid with *R. bracteata*, and grows about 3 feet high.

SOUVENIR DE CHRISTOPHE COCHET (Cochet-Cochet, 1894) has pink flowers flushed carmine, semi-double, and a few large berries.

SOUVENIR DE PHILEMON COCHET (Cochet-Cochet, 1899) has nearly double flowers, white tinged salmon. It is a natural seedling from Blanc double de Coubert, but I do not like it so well. It is not, however, quite so strong in growth.

SOUVENIR DE PIERRE LEPERDRIEUX (Cochet-Cochet, 1895) has a large open flower, scarcely semi-double, and deep purplish rose or violet, very fragrant, with an added sweet-briar perfume. The plant grows 3 feet to 4 feet.

The colour is very distinct and pleasing when quite fresh, otherwise it is not specially attractive, and the chief point of this rose is its fragrance.

SOUVENIR DE YEDDO (mentioned by M. Emile Koehne in his *Deutsche Dendrologie*, 1893), full pink, said by M. Koehne to come from *R. rugosa* \times *damascena*, but Prof. Crepin found it difficult to admit the latter parent (*Bull. Soc. bot. Belg.*, vol. 31, p. 131). I have not grown this plant.

THUSNELDA (Muller, 1889) has pale salmon pink semi-double flowers produced early and late. It is a strong grower and will make a bush 4 feet to 7 feet high. Mr. Paul mentions it as a H. P. hybrid, which seems not improbable, but it has also been attributed to *rugosa alba* \times Gloire de Dijon (*The Garden*, 12th August, 1911). It is a charming Rose of its type, and well worth a place.

Tinted Venus (?). Large single flowers of a delicate blush; quite pretty.

In addition to the above, M. Jules Gravereaux has raised and named a large number of *rugosa* seedlings, but so far as I have been able to ascertain they have not come into commerce.

The following, which are in commerce, I have not grown:—CIBLES (Kaufmann, 1894), carmine, white centre; LA MELUSINE, carmine crimson; NEW CENTURY (Van Fleet, 1901), carmine rose, semi-double; SCHNEELICHT (Geschwindt, 1894), cream; TAMOGLED, double, carmine.

A large number of hybrids with other species have also from time to time been found, or obtained in the garden, including hybrids with the following:—*acicularis*, *californica*, *carolina*, *cinnamomea*, *Fedschenkoana*, *foliolosa*, *gallica*, *humilis*, *lutea*, *multiflora*, *nutkana*, *pimpinellifolia*, *rubiginosa*, *rubrifolia*, *virginiana*.

I shall only refer to those I know something about in my own garden.

RUGOSA × ACICULARIS. This is a strong growing plant from Japan, with very spiny stems and single flowers, crimson lake in colour. It has pear-shaped fruits, and flowers again in autumn.

RUGOSA × FEDSCHENKOANA is also a strong grower. It has slightly glaucous foliage, and bears numerous trusses of light coloured flowers followed by showy fruits. It flowers in autumn as well, so that flowers and fruit are seen on the plant at the same time. It is well worth a place in an open shrubbery.

RUGOSA × FOLIOLOSA is a pleasing little plant, constantly in flower with pretty rosy pink flowers, but it forms no berries. It grows from 2½ feet to 3 feet high and makes a well shaped bush.

RUGOSA × HUMILIS is a natural hybrid producing constantly large heads of nearly crimson flowers. It is a handsome plant for a hedge. I have noticed no berries.

RUGOSA \times LUTEA. This is also known as *R. heterophylla* (not that described by Woods under that name, which belongs to the Tomentosae). It has rather snowy white or cream coloured flowers, carried in small trusses, single or nearly so. It is a somewhat dwarf grower, my plant, which I have had for some years, never having attained more than 2 feet in height, and only possesses two shoots. I have never seen any berries on the plant, which appears to be quite sterile.

RUGOSA \times MULTIFLORA. Siebold's *R. iwara* is believed to represent this cross (Crepin *Prim.*, p. 268). My plant is a strong grower, bearing clusters of flowers, the petals white with incised edges. The fruits do not set. Though similar to Siebold's *iwara*, I do not think it is identical.

RUGOSA \times RUBIGINOSA. Though not so strong in growth as the last, this plant produces berries in quantities, which are bright and decorative.

R. NIPPONENSIS, described by Mr. Dallimore will, I think, one day be regarded as a *rugosa* hybrid.

R. MUCOSA JAPONICA is a curiosity among Roses. It seems like an attempt by a *rugosa* to become a Moss Rose. Every year it throws up a young stem, about 2 feet high and nearly $\frac{1}{2}$ inch thick, densely covered by *rugosa*-like spines and moss. It looks as though it might be a whimsical relative of our group crossed with *centifolia*, but I do not know how near it may be.

There are many problems connected with the Rugosas which remain unsolved; e.g., why do many of the hybrids set their fruit with the greatest freedom, while others are consistently sterile? It might easily be conceived that the double flowers would tend to be sterile, and the singles fruit-bearing. But the rule is not so simple. If we leave the indica hybrids and look only at the few crosses with other species that are known to me, we find the hybrids of *rugosa* with *acicularis* and

Fedschenkoana have fertile berries, while those with *foliolosa*, *humilis*, *lutea*, and *multiflora* are sterile. Here a point is at once obvious. *R. acicularis* and *Felschenkoana* are both members of the same section, the great section of the Cinnamomeae, according to Professor Crepin's arrangement, to which *R. rugosa* also belongs. On the other hand, the four which produce non-fertile hybrids belong to different sections, *R. foliolosa* and *humilis* to the section Carolinae, *R. lutea* to the Luteae, and *R. multiflora* to the Systylae. If this is an explanation, then the crosses with *R. californica*, *cinnamomea* and *nutkana* should also be fertile, while the other hybrids I have mentioned might be expected to be sterile. This does not explain why the hybrid with *rubiginosa* is so fertile. Are hybrids between other members of the section Caninae and *rugosa* also fertile, e.g., that with *rubrifolia*? I should be much interested in any information on this point from anyone to whom these hybrids are known.

Municipal Rose Gardens

By Walter Easlea



THE risk of appearing over sanguine I may say that, in my opinion, every municipality that can maintain a public park will, in the near future, also possess its public Rose garden. My belief arises from what I have seen regarding the Public Rose Garden at Westcliff-on-Sea, of which I shall speak further on.

No one can deny the immense popularity of our national flower, but alas, many thousands of the inhabitants of the British Isles possess such meagre gardens, or maybe none at all, that their love of the Rose is at present limited to what they may see in others gardens or at the Exhibitions.

Probably the carnation or chrysanthemum enthusiast will ask "Why not a municipal garden for their special flower?" My reply to that would be that the Rose is our national flower, and as such must be accorded the pre-eminence. Moreover, is there any hardy plant of which we could make an exclusive garden that can compete with the modern Rose? And the establishment in every suitable locality of a public Rose garden would afford pleasure and instruction to multitudes.

I say instruction, because I can conceive of nothing more helpful to a would-be Rose grower than to visit the public Rose garden of his own district and obtain lessons in preparing the soil, planting, pruning, and cultivating the Roses and selecting the varieties that he likes best, which he can see flourishing, and thus gain more useful information by a few visits than he would from the perusal of dozens of books, with all due apologies to their able writers.

When such gardens are well established the National Rose Society might be able to use some as trial grounds for novel-ties, but of course that is merely a suggestion,

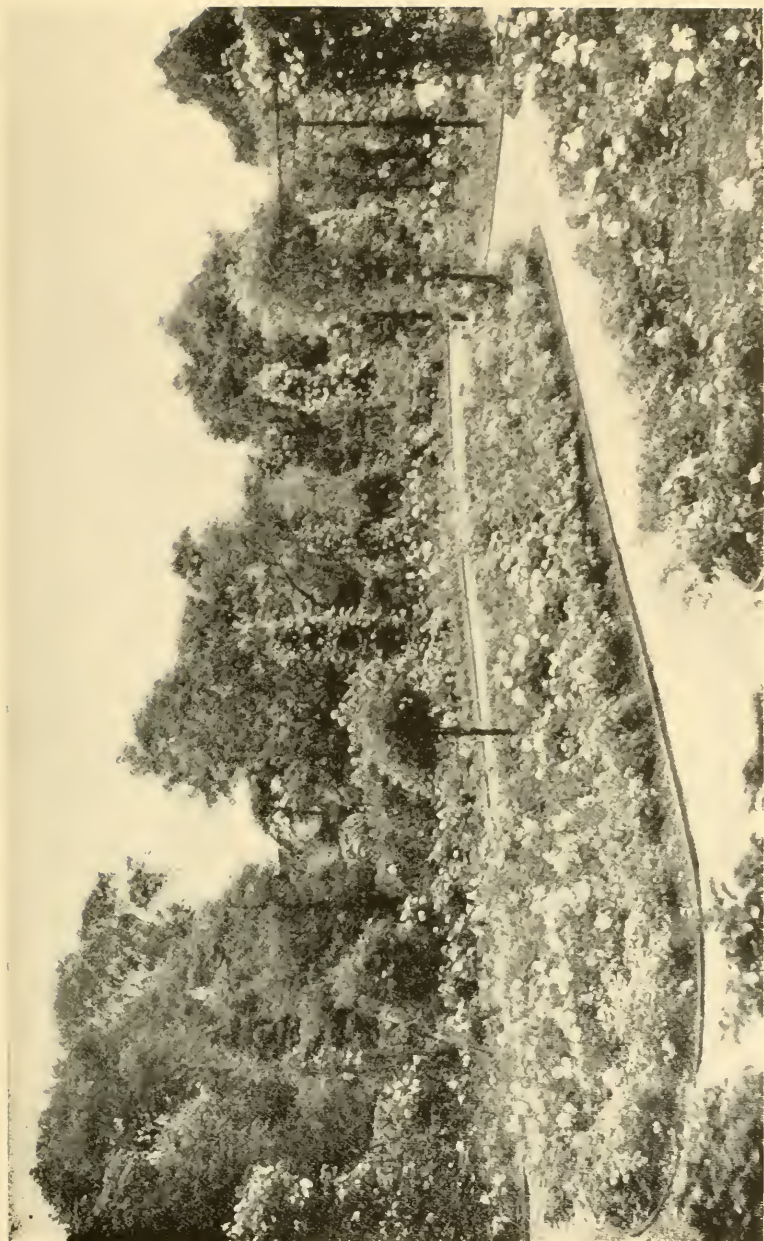
I am sure there can be no better agency for the popularising of a good novelty than a public Rose garden. When American Pillar was first introduced, realising its value, I presented a specimen of this Rose to the Public Rose Garden at Westcliff-on-Sea, and from my own knowledge that plant was the means of inducing scores of people to plant this variety, people who would never think of going to a Rose Show or study a catalogue. From the illustration on opposite page, one may gather an idea of the beauty of such a specimen, which also displays the cultural skill accorded the Rose by the able Superintendent, Mr. Little.

Another useful purpose to which public Rose gardens could be put would be the possibility of utilising them for teaching the rising generation the art of Rose growing, a fact not to be ignored by educational authorities, for if children be given a healthy love of the beautiful, and especially for their national flower, who can limit its far-reaching results?

At present I believe we are far behind America as regards public Rose gardens. In some districts they are being established upon a very lavish scale. The City of Seattle, I have been told, is like one vast Rose garden, and the authorities spend large sums to maintain their upkeep. The American Rose Society have a Test Garden at Elizabeth Park, Hartford, Conn. It is owned by the City of Hartford, and all the work connected with it is under the supervision of the park gardener. It is laid out in fine style, enclosed by hedges of Roses, and contains a Rose temple. Thousands of people visit this garden in the month of June.

I was much struck by the interest taken in the Roses in the Public Park at Lyons, a city that abounds in Rose nurseries, and here one could find some rare old sorts that are now almost forgotten by us; sorts that probably are not even grown by the French nurserymen of the present day.

At our own beautiful Kew Gardens the Roses always attract large numbers of visitors, but I have often thought it a mistake that the Roses are not located together in a well-designed Rosary, rather than scattered about the gardens as is now the case.



PUBLIC ROSE GARDEN
WESTCLIFF-ON-SEA.

I believe there is a plantation of Roses at Purley that the public have access to, and there may be others in other parts of the kingdom, but certainly the best public Rose garden I have met with is at Westcliff-on-Sea, founded by the Corporation of Southend-on-Sea.

A full description of this Rose garden appeared in the *Gardeners' Chronicle*, August 29 of last year [1914], and I am indebted to the Editor for the use of the photograph which appears herewith. It forms a part of the pleasure grounds attached to Chalkwell Hall, a property of some 26 acres, which the Corporation acquired in 1903 for the sum of twenty thousand pounds.

The Rose garden, planted in 1908, is about half an acre in extent. It contains nearly 2,000 plants—tall pillars, weepers standards, bushes and hedges, and comprises all the best and up-to-date varieties. On Sundays and special days during June, July and August the garden is crowded with residents and visitors, and note books are as plentiful as at Vincent Square. All the Roses are carefully labelled with Acme labels. The luxuriant growth is a wonder to behold, and when in a good soil, such as abounds all over the district, it would appear that Roses revel in the sea air, which is manifest from the ripe condition of the wood.

It may be thought that war time is hardly a fitting moment for introducing the subject of public Rose gardens, but surely no harm can be done if the suggestion finds favour with local authorities, and I would ask all local secretaries to use their influence towards establishing such gardens in their own districts, and perhaps in some places the conclusion of peace, when it comes, might be celebrated by the establishment of a public Rose garden.

Public Rose gardens should be easy of access, although in crowded districts it would be advisable to plant in the suburbs. If land is very expensive a smaller area than half an acre might suffice, but I do not advise much less. Of course in many localities the land is already in the possession of the authorities, and the site could be obtained in many cases either by enclos-

ing a plot of the grass land, or it may be by discarding some shrubberies, as in the case of part of Chalkwell Park.

With all due respect to surveyors, I would strongly advise that the details be left to a committee of Rose growers, and local secretaries might help in forming such committees. At Chalkwell Park the authorities had the advice of Alderman Martin, a Rose grower of local renown, and in practically every district there may be found gentlemen well qualified to advise as regards site, preparation and selecting the varieties.

Friendly rivalry could be encouraged by offering cups or medals for the best designed Rose garden, and also for the one best cared for. In many localities the local Rose Show could be held close by the Rose garden, and thus afford the public an additional pleasure. Data relating to varieties best suited to each locality and other details would be of the utmost value to all who study the Rose and its culture.

In conclusion, I have just a word to say as regards our public parks in London and other large cities, where the conditions are not favourable to Rose growing.

I would suggest that a Rose garden be laid out, the beds being filled with bulbs for the spring and then with Roses for the summer. Plants from the open ground potted up into eight-inch pots in October will yield grand blossom the following summer. The plants could be grown in pits and brought on ready for plunging in the beds in June, and removed again in late autumn.

This is done already in some parks, but instead of locating the beds here and there, if arranged altogether the effect would be better, and the public instructed thereby as to grouping and other details. It is a simple matter to grow ramblers, weepers, and standards in tubs, and surely they deserve as much time and trouble as many of the subjects we find in our public parks during the summer. At least they would be far more natural than exotic things such as palms and castor oil plants.

I hope from the wide publicity of this publication that the authorities concerned in establishing garden cities will bear

in mind the suggestion of forming a public Rose garden. With them it would not be so arduous as in old established boroughs where land is difficult to secure, but it may be some public-spirited residents of even such boroughs as last mentioned may see their way to offer sites for establishing a public Rose garden, and thus help to create an even greater love for our national flower.

*The Progress and Development of the Rose During Those One Hundred Years of Peace**

*By H. R. Darlington, N. R. S., and Rev. J. H.
Pemberton, N. R. S.*

MR. DARLINGTON



HAVE had some serious thought how it is that you have been so kind as to confer upon me the honour of opening this discussion on the development of the Rose during the last hundred years at this Conference, and I have been a little bit puzzled, but we are celebrating a long peace with America, and it has occurred to me, and it occurred to me last night particularly as I paused in front of a large bed of Richmond in full flower, looking at its very best, that possibly the reason that you have asked me to come and open this discussion, in remembrance as it were of our friends from America over the water, has been my especial love for the Rose Richmond, an American Rose brought out by the E. G. Hill Co.

America's Help

The subject that I am to deal with this afternoon is the development of the Rose during the last hundred years. It

* From a report of the Anglo-American Rose Conference, held at Shepherd's Bush, June 23, 1914.

is not a little remarkable that the development of our modern Rose almost accurately coincides with these hundred years of peace with America. It is mere coincidence except to this extent, that the Americans, at the beginning and in the middle and at the end of our period, have proved of great assistance in the development of our favourite flower. At the very beginning and again at the end they have helped to produce a new group or race of Roses for the world.

Theophrastus

M. Jules Gravereaux has told us that for two thousand years the Rose has suffered from a phrase which was perfectly accurate, but which has been accepted, like many other true things, without any limitation, as if it covered the whole ground. Three hundred years before Christ Theophrastus wrote a book on the history of plants, and in that book he naturally dealt with the Rose. It is clear that he knew something about Roses, because he said that they differed not only with regard to the number or the fewness of their leaves, by which he meant the petals, but that they also differed in their roughness or smoothness of texture, in their colour and in their perfume; and he went on to say that most Roses had five leaves, or five petals, to use our modern term; but that there were many that had nine petals and twelve petals and twenty petals, and that he had heard it said—he evidently would not put it on his own authority—that there were Roses with as many as one hundred petals. It is evident, therefore, that 300 years before Christ Theophrastus knew a great many Roses. The Romans were in the habit of accepting from Greece their art wholesale, and we find that Pliny, who also wrote a book of Natural History, mentions twelve different varieties of Roses, and he repeats this famous saying of Theophrastus, which is as follows: "The Rose can be raised from seed . . . but on account of its slowness in coming to maturity, it is directed to be propagated by cuttings."

To that statement, which was incorporated by Pliny without

acknowledgment or limitation, the Rose has suffered for two thousand years. There is no doubt that the development of the Rose during that period almost stood still. Pliny, as I mentioned, had twelve Roses. Even Parkinson in 1656 had only twenty-four; and it is a very curious thing that while the influx of the barbarians for a time evidently drove the Rose into the convents, and into the big castles of the country where some protection could be afforded, yet when the new learning came about and a revival of gardening took place, the Rose did not for some hundreds of years benefit to the same extent as the anemone, the daffodil, the tulip, the pink and many other flowers. These were studied by our florists long before the Rose came to be developed at all. Development was only just beginning at the end of the eighteenth century.

Nevertheless, during that eighteenth century, three great importations had been made—the importation of the three forms of *Rosa indica*, which were to form the foundation of our modern garden Roses. At the beginning of the eighteenth century, that is, 1718, came the Old Blush Monthly Rose, a Rose that is always flowering. About three-quarters of the way through the century there was brought into England *Rosa indica semper-florens*, the Red China Rose, and towards the end of the century, according to some, or at the beginning of the nineteenth century, according to others, there was imported into this country *Rosa indica odorata*, the origin of our Tea Roses. Very shortly after that we had two other developments. The limitation that Theophrastus had imposed on the propagation of the Rose was being gradually cast aside and people were beginning to sow Rose seeds. The result was seen very early in the century, for in 1809 came Lady Portland's Rose, the first of the Perpetual Damask Roses. A year later we got the first of the Boursault Roses, a hybrid of the Rose *alpina*. There are several of the Boursaults still in our gardens. In the first year of our period (the year of the Battle of Waterloo) we find that the number of names of varieties had risen to 250. This was undoubtedly a



FRANCIS SCOTT KEY

great advance in the production of the Rose. But I say "the names of varieties" advisedly, because, while the varieties had increased in number there is no question that the number of synonyms had also increased, and very many of the names of that period are attributable to one Rose only. In several cases you will find four, five and six names given to the same Rose. M. Gravereaux has worked this out on an elaborate scale, and I will give you one name only, Agatha Incarnata, which is the same as the following six Roses. Miller called it *Rosa incarnata*. It was also called Tout Aimable, Tendresse Admirable, Caprice de Zephyre, Marie Louise, and also years later (and under this name it is possibly remembered by some of us today) the Duchesse d'Angouleme. In 1815 therefore it can only be said with certainty that there were 250 names, though probably there were a good many varieties as well, and the year 1815 is of importance in another respect. In that year came before the world, or rather before the Director of the French Gardens, Comte Lelieur, a Rose which was the foundation of our modern hybrid perpetual Rose. The seed must have been sown some year or two previously by Souchet, a French gardener, and in August, 1815, he showed this Rose to Comte. Lelieur. For several years afterwards it was known under the name of Comte. Lelieur, but Louis XVIII took a great delight in the Rose, and in consequence, when it was brought out in 1819 it became known, in compliment to him, by the name of Rose du Roi. Another great race started at the same date, and to this we are indebted to our friends from America. I refer to the Noisette Rose. Probably the seed must have been sown about the same time as the seed of the Rose du Roi, and the first plants were sent from America to Paris in the year 1817. We find therefore at the beginning of our epoch the rise of two very celebrated Roses. This Noisette Rose, which was sent from America is still to be found in its representatives. We have Aimee Vibert, a seedling brought out in 1828; Lamarque, 1830; and Celine Forestier, 1858; and Marechal Neil, perhaps the best of the whole race, was obtained in 1864. I do not know that any Noisette has been brought out comparable with Marechal Niel at its best.

Increase of Varieties

Now let us notice what a wonderful development followed. We had 250 Roses in 1815; in 1828 there were no less than 2,500—ten times the number. That is to say they had come out at the rate of 173 Roses a year, and it is only in very recent years indeed that this volume of production has been anything like equalled. That development went steadily forward. In 1845 we had 5,000 Roses; when the "*Noms des Roses*" and its wonderful list of Roses, with which many of you will be acquainted, was published in the year 1906, we had over 11,000; and the probability is that today we have something like 12,000 Roses.

Real Advance

Why am I laying stress on this wonderful production of Roses? I want to carefully distinguish between the development in the number of varieties and the true advance in the Rose. The development in the number of varieties has, since the beginning of our period, been absolutely consistent and steady. The advance in the development of the Rose has been of quite a different character. Instead of a steady stream it has come by a series of jumps, and it has always followed the same general process. One of these jumps has occurred, and a new race of Roses is founded, sometimes scarcely perceptibly at first, sometimes after long and wearisome experiments and perhaps great failure, the new group has grown. It has suddenly arisen and then it has proceeded to develop; and the arrival of a new group has always been followed in the next few years by a certain development within that group; so that it is not always the first Rose of the new group, great though may be the real advance, that first receives recognition by the public. Besides this distinction between the two methods in which our Roses have developed (between the mere increase of varieties and the rise of new groups), the development of the new groups has taken place in two absolutely different fashions. In the first case we find the new group develops out of the Roses which were growing in

gardens at the time, and has been obtained by seed sowing, and by careful crossing and selection of varieties; and by that means have been obtained some of our most notable groups. In this way we got the hybrid perpetuals, the hybrid teas and if, as I think, it is a new group, the modern Decorative Tea and the modern China Rose. These are in themselves quite distinct groups, and they all grew by this gradual process of cross-fertilisation and selection.

Hybrid Perpetuals

Let me trace two of the big groups. First of all, the hybrid perpetual which, as I mentioned, started with the development of the Perpetual Damask in the Rose du Roi. My friend Mr. Pemberton, with a sort of prescience of what I was going to talk about, has been so kind as to bring before us a small vase of the Rose du Roi, and I hope he will allow those who are interested in it to see the wonderful flowers which laid the foundation of our hybrid perpetual Roses, and as I have also said laid another foundation, the foundation of the flower trade of Paris. The flowers are not very much to look at, but they are perpetual and give a continuance of flowering. We did not get the true hybrid perpetual until the year 1842. In that year two Roses were brought out to found the new race; one was La Reine, and the other Mme. Prevost, introduced by two French raisers, and the process by which they came can be traced. First came the Portland Rose, then the Rose du Roi, then there was Athalin, then Malton, then Mme. Laffay, all gradually improving till we got to the true hybrid perpetual in the two Roses I have mentioned, La Reine and Mme. Prevost. A few years later we got the first of the true hybrid perpetual red Roses in General Jacqueminot, and this General Jacqueminot had an interesting and even pathetic history. An amateur called Roussel had a garden at Mendon in which he was fond of hybridising; but during the whole of his life he never succeeded in raising anything of great renown. On his death he left his Roses

to his gardener, whose name curiously enough was Rousselet, and a year after M. Roussel died there appeared the Rose called General Jacqueminot. You all know it; its wonderful colour, delightful perfume and freedom of flowering even for a hybrid perpetual.

Hybrid Teas

The hybrid teas have followed very much the same route. The first of them, La France, appeared in 1867. In 1873 we get two more of these new Roses, Captain Christy and Cheshunt Hybrid, for which we are indebted to Mr. George Paul. Now the development has followed an exactly similar course in both cases. First the birth and recognition of the new race, then the development of the new varieties within the race. Caroline Testout and many others followed. Perhaps the two Roses which were most prolific in the production of the new race of hybrid teas were Victor Verdier, a Rose which many years before had possessed something of the character of the hybrid teas—and a wonderful Rose, which I believe I have never seen myself—Mme. de Tartas. Now Mme. de Tartas was really an extraordinary Rose, for not only was it one of the parents of Cheshunt Hybrid, but it was the foundation of another race, the race of modern Decorative Teas, among its children being Marie van Houtte, Mme. Lambard and Anna Maria de Montravel. Through the last-named Rose it has founded again yet a third race in the Polyantha Pompons. I think, therefore, I am justified in saying that Mme. de Tartas is worthy of special recognition by Rosarians.

I have dealt with the first method by which the new groups of varieties have been produced.

Multiflora Group

The second method has been of an entirely different character, and curiously enough it has generally occurred in the climbers. It has been effected by the more or less immediate cross of some Rose having a good deal of *indica* blood in it, or *R. indica* itself, with one of the species of wild Roses. We

find an instance of this occurring direct in America both at the beginning of our period in the Noisette Roses, and also 100 years later at the end of that period in the wichuraianas; both these groups at the time they were introduced created something in the nature of a revolution in our gardens. Now these are instances of this jump I have spoken of occurring almost as soon as the new race was brought out. If we take the Multifloras, another instance of this second method of production of new groups, we find something very different occurring. *Rosa multiflora* was introduced into this country in 1785, but the first hundred years of seed sowing from that Rose produced nothing of any real value, many crosses being tried during that period, of which perhaps the two best known are a Rose called Grevillia, or the Seven Sisters Rose, and Laure Davoust, which is still to be found in many gardens up and down the country. But it was one hundred years and more after the introduction of *R. multiflora* before we got the first of the modern *multiflora* group brought before us in Turner's Crimson Rambler, which came out in the year 1893, and at once revolutionised our gardens.

Pernet Group

The latest of the new groups of Roses, curiously enough, is in a way a combination of the two methods. This new group is a group which has recently been recognized by the National Rose Society as having been worthy of that distinction; it is a group brought out by M. Pernet-Ducher, and I understand to be called the Pernet group. It was brought out by M. Pernet-Ducher in this way; he hybridised the Rose, Persian Yellow, which for a long time had been in our gardens, but no doubt is not far removed from a known species, with the hybrid perpetual Antoine Ducher, and that cross gave the Rose Soleil d'Or, a yellow Rose not of very much value for garden purposes, but which has proved a most useful and prolific parent; and undoubtedly some of our most interesting Garden Roses of the present time, Rayon d'Or, Willowmere,

Mme. Edouard Herriot, and the "Daily Mail" Rose are instances of Roses sprung from this new cross. This new group, as I have said, has arisen partly by the first and partly by the second method. But there, just as in the other two cases, you get exactly the same procedure followed, namely, first the new group has arisen, and then has followed development within the group.

MR. PEMBERTON

I am very pleased to come here and have a talk about the Rose. However, it is very difficult to follow after such a speaker as Mr. Darlington, because, as happens in nearly every case when you are at a Conference, the first speaker takes the plums out of the basket and one has not very much left. He referred to one or two things I might have spoken about, and I will pass those over. I desire to confine my attention this afternoon to just the one hundred years; I do not want to go back further than that. Let us look at the development of the Rose during the last one hundred years. Mr. Darlington very kindly called your attention to the Rose du Roi, two or three blooms of which you will find down the side of the hall, and this brings me to another instance, in which I thought I might go outside the one hundred years. I have given you a Rose that was grown in England in 1575. That was old, but that is just to accompany the others, so that they might feel young in comparison with the old York and Lancaster.

The Empress Josephine

This is an age when one talks a good deal about the ladies, and I think with regard to these last hundred years one lady in particular has had a great deal to do with the development of the Rose, for it is no good for raisers to bring out new Roses, it is no good for Mr. Cant to show his beautiful seedlings in the garden if you do not get anybody to look at them or care for them, and if there were no lovers of Roses, I do not think that the trade would go on trying to give us new beautiful

varieties. At the end of the last century the Rose was one amongst many flowers. Everyone was running after tulips. Then came a lady, the Empress Josephine, who was devoted to her flowers. She loved her garden and she knew what a help it was when she had troubles and difficulties,—and she had a good many of them—to get into her garden right away from the trouble, and go down to her country seat at Malmaison. She said: "We have collections of tulips and other things, why not have a collection of Roses?" Then she ordered her head gardener to form a collection, and just to stir up and encourage people to being out new races she had a rosary. She did the thing thoroughly. She said to the gardener: "Get every Rose you can and name them all;" and I believe at that time she had about 250 varieties, and at the present time at Malmaison, owing to M. Gravereaux, they have the same garden, the same shaped beds, with the paths as she had them then, and the same Roses, so far as they can find out the varieties she grew, are growing there now. She got a man as her botanist called Ventenat, and he not only planted the flowers, but she, with his help studied the botany of Roses. Not content with that, she went to the celebrated painter, Redoute, and got him to paint the Roses, and it is to her that we owe those beautiful volumes of Redoute, the authority on the Rose in the days gone by. If you have not seen those books, go to the British Museum or to the library of the Royal Horticultural Society and study them; and when you go, remember they are the result of the Empress Josephine stirring the people up to form these collections. What was the result? She was at the head of French Society, and every lady in the fashion said: "We must have Roses too. If the Empress has Roses, we must have Roses." And so away they all went to their own gardens and had Roses, and the result of that was that raisers of Roses sprang up all around. Mr. Darlington has told you about the Noisette, and amongst the raisers of others were Laffay, Desprey, Hardy, Vibert and Prevost. All of these we owe to Empress Josephine. Looking through the list of what she was supposed to grow, I find

Provins 107, Centifolia 30, *Rosa indica* 21, and 9 Damasks. But you notice that not one of those were autumn flowering; that is, they only had one crop of flowers a year. And it was just at the end of her time that the perpetual flowering variety—that is the variety which gives more than one bloom a year—was discovered that from the Portland and the Rose du Roi, and the result of those two parents being the hybrid perpetual.

Noisettes

Now we are thinking about our American friends. Mr. Darlington has mentioned the Noisette. The Noisette was raised in America by Phillippe Noisette, and it was called in those days *Noisettiana*, in honour of the man who raised the Roses. You can always tell a Noisette by the way the foot-stalks form on the centre stalks. He sent it over from America to Paris to his brother Louis for propagating, and so you get the Marechal Niel as a Noisette, and you get some of the most popular Roses coming from the special Rose which Phillippe Noisette raised in the United States. A celebrated gardener, M. Jacques, in 1825 was head gardener at the residence of Louis Phillippe, Duc d'Orleans, at Chateau Neuilly. He has given us several well known Roses: Adelaide d'Orleans in 1826; Leopoldine d'Orleans in 1828; and in the same year Felicite-et-Perpetue. Referring to the National Rose Society, I can remember showing Roses in Rose boxes before the National Rose Society was formed, and we had nothing in those days but hybrid perpetuals and a few Teas, so that you can imagine the progress of the Rose from that day to this; but what we want more than anything else at the present day is that they should be perpetual, that is, they should be as good in the autumn as in the early summer.

Wichuraiana and Pernetiana

We had very few ramblers in the early days. We have now, as Mr. Darlington has told us, the *wichuraiana* class, and the Americans have been of the greatest help in the production of

wichuraiana Roses. I am referring to such Roses as Dorothy Perkins, and so on. The pioneer was a European, but two Americans who have given us some of the best *wichuraiana* ramblers are Mr. H. Walsh and Mr. Manda. In regard to the latest great race, everybody calls it the *Pernetiana* race all over the world, and if the National Rose Society is going to keep pace with the rest of the world, it must fall into line and give M. Pernet-Ducher the honour that is due to him for bringing out such a fine race of Roses. You should remember his great object is the colour of the Rose and the freedom of flowering; never mind the shape. Of course, we like good shape, but those are the two most important things, and if you look down the lists of Roses, they are the most popular Roses of the present day, we have a great many of them—Prince de Bulgarie, Joseph Hill and Mme. Abel Chatenay are some, and last of all those glorious yellow Roses, Rayon d'Or.

But whilst I have spoken about the French and American growers, we must also remember that in the last few years we have had tremendous help from our own people in Great Britain.

The Establishment of the International Garden Club

A Review by the President



LOOKING back it is extraordinary to note what the past three years have accomplished in the history of gardening in this country. It may almost be said to have been an awakening rather than a Renaissance that took place in and about 1914—as apparently simulta-

neously during that year sprang up small Garden Clubs all over the country. There seemed a general desire for a place of reunion where Garden interests could meet and acquire information. The Trade and Gardeners' Associations equally felt the movement and one of the best results among these was the development of the *Gardener's Chronicle of America* which has become such a charming and valuable addition to Garden literature.

The International Spring Flower Show began to be held in New York about this time and to attract general attention from the Public. This great Annual Exhibit has become increasingly popular and is a splendid educational opportunity for Garden owners. A Flower Show at best, however, is a crowded affair and lasts but a short time and it was felt that a more social and permanent place was needed where people interested in Horticulture could meet and gradually develop an institution corresponding to the Royal Horticultural Society in England, that has an organ in its *Journal* which is of world-wide value and spreads horticultural information among thousands of persons.

In March, 1914, a few interested persons met and formed the International Garden Club and the following circular was sent out. The response which it met was gratifying (several hundred persons joining), and showing how welcome such an organization was:

THE INTERNATIONAL GARDEN CLUB

The International Garden Club invites you to become a Charter Member of the Association which has been formed for the purpose of bringing together the various horticultural interests of the country, and of having a Club House in New York, where its Members may meet.

The Association has been modeled after the Royal Horticultural Society of Great Britain, which has accomplished so much by creating a centre for those interested in Horticulture in England, and it is hoped that the International Garden Club will fill the need for such a Society, which is felt over here.

The Club will coöperate with other Garden and Horticultural Organizations and will be affiliated with Foreign Societies. Negotiations are under way for a suitable Club House, with surrounding grounds where experimental gardens will be maintained, a library collected, lectures given and exhibits held.

We are pleased to state that the interest and assistance of The Commissioner of Parks of Manhattan and Richmond and The Commissioner of Parks for the Bronx have been enlisted to carry out the project, and it is proposed to open the Club House early in the autumn.

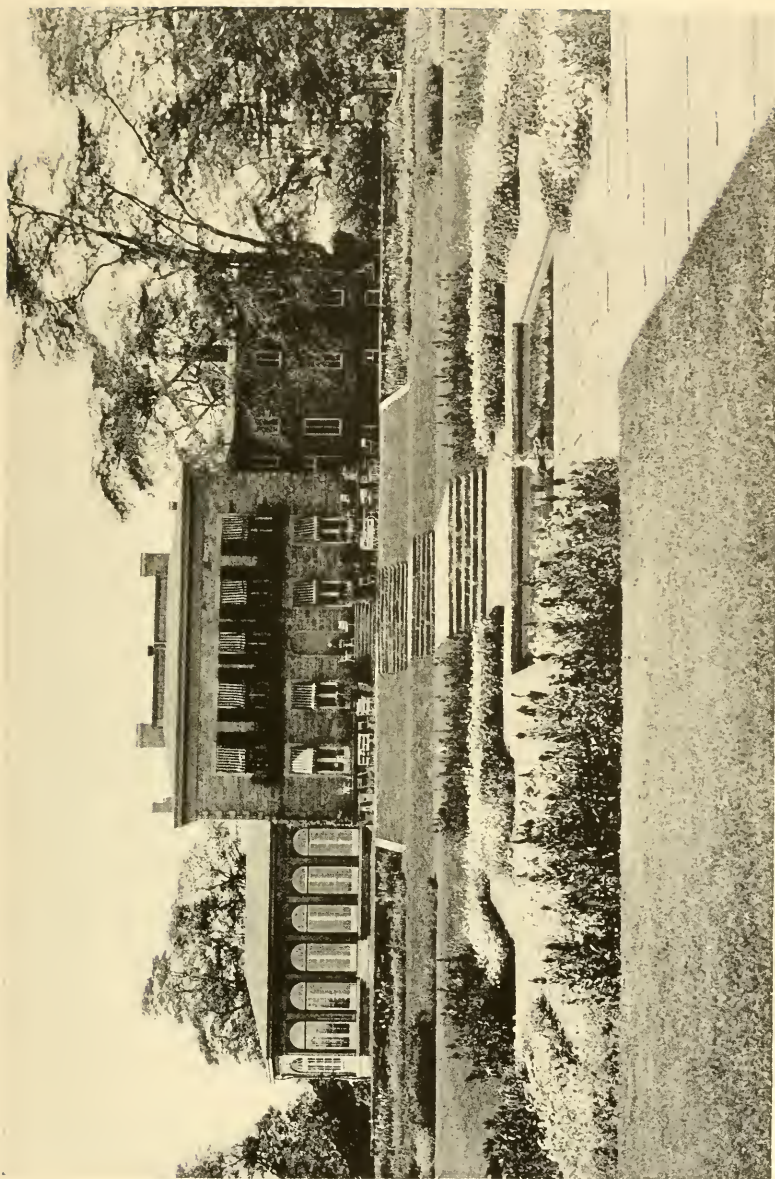
The Club is being incorporated, and there will be no financial indebtedness incurred beyond the payment of the initiation fee of Twenty-five Dollars for Charter Members, and annual dues of Ten Dollars.

Those in sympathy with the undertaking and desiring to become Charter Members, will kindly fill out the enclosed card, and return with cheque to the Treasurer Judge William A. Day, Equitable Life Assurance Society, 165 Broadway, New York.

Communications should be addressed to the Secretary Miss Mary M. Kearney, 123 East 53rd Street, New York.

Invitations to become Charter members are limited. When the number required has been obtained, membership thereafter will be by election.

There followed a list of individuals who were patrons of the new organization: Their names will be found on page 264.



TERRACE GARDEN, INTERNATIONAL GARDEN CLUB, 1915



INTERNATIONAL GARDEN CLUB, 1840 IRON WORK IN BALCONIES

To our Trusty and Well-belov'd
Mr Pell, Our Resident with the
Protestant Consuls of Switzerland.

Sir,

The State of affaires being much altered
in those Parts, so that your longer abode
there seemeth not so necessary, and that
your returne hither may be more serviceable
to us, I have thought fitt hereby to recall
you. Therefore you will do well having
taken your leave there in the best manner,
to repaire homewards that We may receive
from you the account of your whole negoti-
ation, and you from us the encouragements
which you have deserved. So I rest

Your loving friend,

Whitehall May 6.
1658.

Oliver P (Protector)

A circular of information about the club was also issued which we reprint herewith:

INFORMATION

The International Garden Club has under consideration the old Bartow place in Pelham Bay Park (just beyond the Zoological Garden) which with its surrounding grounds and situation is ideally suited for a Club House and experimental gardens.

It is near town and can easily be reached by road or rail, having already its own station of Bartow.

Organization

The Club will have the usual organization of a board of managers in classes of one, two and three years, and like Ranelagh and other clubs near London, England, a simple restaurant will be maintained where Luncheon and Tea can be had.

Lectures

Following the lines laid down by the Royal Horticultural Society in England it is the purpose of the International Garden Club to create a course of standard lectures which can be applied for by other Garden Clubs and Horticultural Societies as all the Garden Societies feel the lack of good lectures.

Exchange of Plants

Already offers of plants from the Rose and other Societies have been made for the gardens, and as the Council of the Club represents Gardeners from all over the country an interesting interchange of plants can be made, and plants will also be distributed among individuals not otherwise able to purchase them in order to encourage the growth of cottage gardens throughout the country, in which the Royal Horticultural Society has been so successful in England.

A department of labor will be established with examinations for gardeners and a certificate from the Club.

Exhibits

Small monthly exhibitions are the most practical means of acquiring knowledge of flowers and plants and the success of those already started by the Horticultural Society of New York in the Museum of Natural History goes

to prove how grateful the public is for such means of study. The International Garden Club will coöperate with the Societies who specialize on various flowers and plants in giving these exhibits at the Club House.

Those desiring to qualify as teachers for the public school gardens will be admitted free to study under the Superintendent on certain conditions.

The International Garden Club aims to assist other Horticultural Societies in their efforts and has offered prizes at the Spring Flower Show at the Grand Central Palace, March 21 to 28 to which it calls your attention.

The Club was incorporated in June, 1914, and in September, 1914 obtained from the City of New York a lease of the old Bartow Mansion in Pelham Bay Park. This fine old colonial house was fast falling into ruins, its beautiful old trees going to decay, and in another couple of years would have been fit habitation only for the birds. It is fortunate for the city and the people of New York that the Garden Club was able to obtain this particular piece of property as it is the most historical of all these properties in Westchester. It still has the old Pell graves and the remains of the Oak under which according to tradition John Pell purchased this part of New York from the Indians for seventeen dollars and fifty cents, in 1654.

We reproduce herewith copies of two old documents with the original John Pell's signature on one of them, which may be of interest to many readers. A full history of the place will be given in a subsequent issue of the JOURNAL as it has been asked for by our members many times, but has been difficult to obtain.

We give a copy of the invitation to the opening of the Club House on May 1, 1915 when the Governor of New York was present and replaced the old Treaty Oak, which had burned down, by planting a Red Oak near the historical spot.



THE INTERNATIONAL GARDEN CLUB

REQUESTS THE HONOUR OF YOUR PRESENCE

AT THE OPENING OF THE CLUB HOUSE

BARTOW MANSION, PELHAM BAY PARK

IN THE CITY OF NEW YORK

ON SATURDAY, THE FIRST OF MAY

ONE THOUSAND, NINE HUNDRED AND FIFTEEN

FROM HALF AFTER THREE UNTIL SIX O'CLOCK

AND AT THE

CEREMONY OF THE REPLACING OF

THE TREATY OAK

BY THE

GOVERNOR OF THE STATE OF NEW YORK

AT FOUR O'CLOCK



R. S. V. P.

MRS. H. DE BERKELEY PARSONS

36 EAST 61ST STREET

PATRONS

The Governor of the State of New York and Mrs. Whitman
The Mayor of New York City and Mrs. Mitchel

OFFICERS

HONORARY PRESIDENT
Dr. Nicholas Murray Butler

PRESIDENT
Mrs. Charles Frederick Hoffman

VICE-PRESIDENT
Dr. George Norton Miller

TREASURER
Judge William A. Day

ADVISORY BOARD AND RECEPTION COMMITTEE

The President of the Board of Aldermen
The Commissioner of Parks of Manhattan and Richmond
The Commissioner of Parks for The Bronx
The Comptroller of the City of New York
The Commissioner of Water Supply, Gas and Electricity
The President of the Botanical Garden
The President of the Horticultural Society of New York
The President of the Florists' Club of New York

Mr. and Mrs. Vincent Astor
Mrs. Richard Aldrich
Mrs. Charles B. Alexander
Mr. Frederick H. Allen
Mr. J. Lawrence Aspinwall
Mr. and Mrs. Sackett N. Barclay
Mr. and Mrs. Edmund L. Baylies
Mr. and Mrs. George F. Baker, Jr.
Mrs. Albert Boardman
Mrs. Edward N. Breitung
Dr. N. L. Britton
Director of the New York Botanical Garden
Mr. Frederick G. Bourne
Mrs. Amory S. Carhart
Mr. and Mrs. Alfred Coats
Mr. Henry A. Coster
Mr. R. Fulton Cutting
Mr. and Mrs. Charles D. Dickey
Mr. William Adams Delano
Mr. Henry F. Dupont
Miss Alice A. Driggs
Mr. Martin C. Ebel
Secretary of the National Association of
Gardeners
Mrs. Alfred Ely
Mrs. Newbold LeRoy Edgar
Mr. and Mrs. Stuyvesant Fish
Mrs. Henry Clay Frick
Mr. and Mrs. George Frelinghuysen

The Rt. Rev. David H. Greer, D.D.
Mr. and Mrs. Lawrence Gillespie
Miss Virginia Gildersleeve
Mr. Madison Grant
The Very Rev. William H. Grosvenor,
D.D.
Mrs. William Pierson Hamilton
Sir Arthur and Lady Herbert
Miss Sarah Cooper Hewitt
Miss Elizabeth Stewart Hamilton
Mrs. E. H. Harriman
Mr. and Mrs. McDougall Hawkes
Mr. Charles Frederick Hoffman
Mr. and Mrs. William M. V. Hoffman
Mr. F. Burrall Hoffman, Jr.
Mr. Francis L. V. Hoppin
Mr. Henry R. Hoyt
Mr. Archer Huntington
Mr. Arthur Herrington
Mr. and Mrs. Columbus O'D. Iselin
Dr. and Mrs. Walter James
Mr. and Mrs. Oliver Jennings
Mr. and Mrs. Walter Jennings
Mrs. De Lancey Astor Kane
Mr. and Mrs. Grenville Kane
Mr. Otto H. Kahn
Mrs. Van Rensselaer Kennedy

Mrs. Francis King
 Mr. and Mrs. George Gordon King
 Miss Mary M. Kearny
 Mr. and Mrs. John Callender Livingston
 Mr. and Mrs. Gerald Moncrieffe Livingston
 Hon. and Mrs. Seth Low
 Mrs. Philip Martineau
 Dr. and Mrs. D. Hunter McAlpin
 Mrs. Junius Morgan
 Mrs. J. Archibald Murray
 Mr. George V. Nash
 Secretary of the Horticultural Society of
 New York
 Mr. Frederick Newbold
 The Duchess of Newcastle
 Mr. William W. Niles
 Mr. Hoffman Nickerson
 Prof. and Mrs. Henry Fairfield Osborn
 Mr. and Mrs. H. de Berkley Parsons
 Mr. and Mrs. William Barclay Parsons
 Mr. and Mrs. Herbert Claiborne Pell
 Judge and Mrs. Francis Key Pendleton
 General Horace Porter
 Mr. George T. Powell
 Mrs. Pulitzer
 Mrs. James Lowell Putnam
 Mrs. Frederick Pearson
 Mrs. Moses Taylor Pyne
 Mr. T. J. Oakley Rhinelander
 Mrs. William Hamilton Russell
 Mr. George L. Rives

Mr. and Mrs. B. Aymar Sands
 Professor Sargent
 Mrs. Herbert L. Satterlee
 Mr. and Mrs. Charles R. Scott
 Mrs. William F. Sheehan
 Mr. Edward R. Sheldon
 Mrs. James Speyer
 Mr. William Rhinelander Stewart
 Mr. and Mrs. Alfred Seton
 Mrs. Charles H. Senff
 Mr. and Mrs. Henry Waters Taft
 Miss Amy Townsend
 Mrs. Oakleigh Thorne
 Mrs. Henry M. Tilford
 Mr. William Turnbull
 Mrs. Hamilton McK. Twombly
 Mrs. Vanderbilt
 Mr. and Mrs. Cornelius Vanderbilt
 Mrs. Schuyler Van Rensselaer
 M. Le Comte de Viel-Castel
 Mrs. John Hobart Warren
 Mrs. Whitney Warren
 Mr. and Mrs. Marshall Orme Wilson
 Rev. W. Wilks
 Secretary, Royal Horticultural Society of
 Great Britain
 Prof. E. H. Wilson, F.R.H.S.
 Mr. and Mrs. Frank S. Witherbee
 Mrs. J. J. Wysong
 Mr. John Young
 Secretary of the Florists' Club, New York

The occasion was a memorable one. Over two thousand of New York's prominent citizens were present, a detachment of the Seventh Regiment Artillery preceded the Governor and added to the interest by firing a salute of twenty-one guns on his approach. Mrs. Hoffman, President of the Club, accompanied by Dr. Butler, Honorary President, Mrs. Parsons, Dr. George Norton Miller, Vice President, Mr. Rives, Mr. Hoffman, Mrs. C. B. Alexander, Mrs. Stuyvesant Fish and Mrs. E. H. Harriman received the Governor and his Staff and Mrs. Whitman at the Portico.

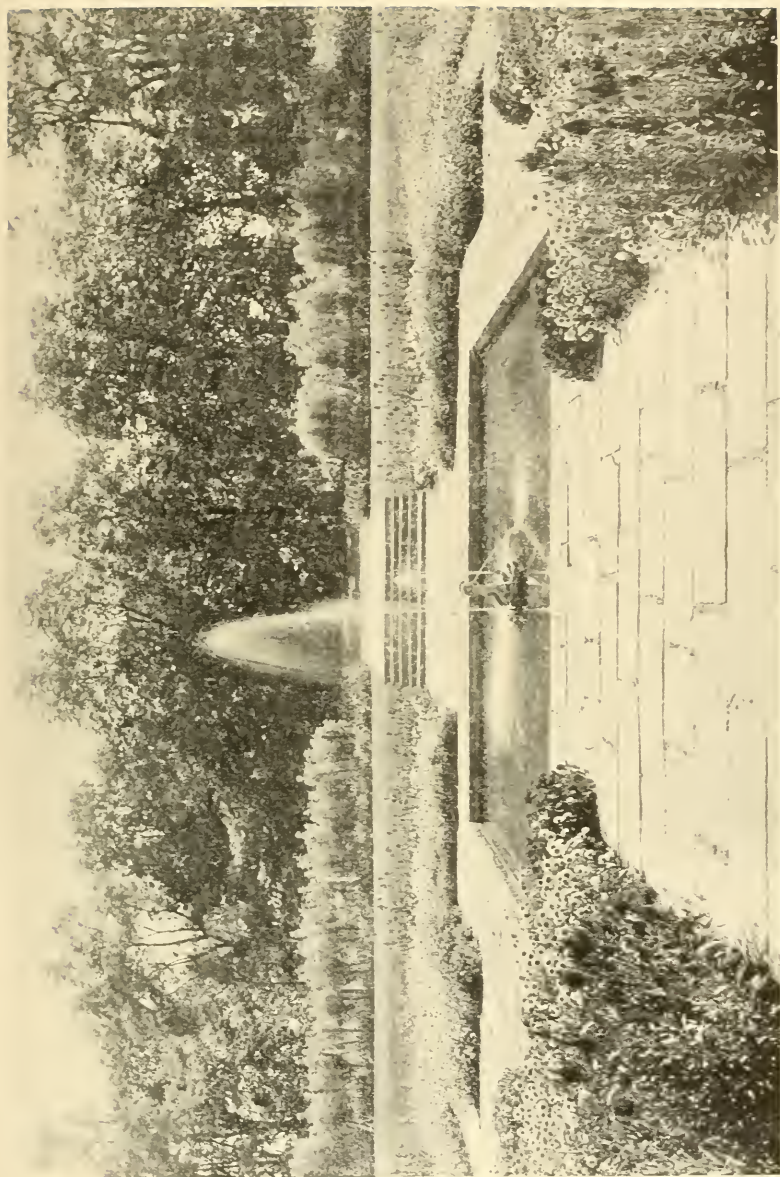
Mr. William Adams Delano, of the firm of Messrs. Delano & Aldrich had charge of the doing over of the mansion and the building of the Terrace Garden and Mrs. Hoffman, Mrs.

Parsons, Miss Swift and Marcotte & Co. of the furnishing. Mrs. Fish, Mrs. Alexander, Mrs. Speyer, Mrs. Senff, Mrs. John E. Alexandre, Mrs. Carhart and many others contributed towards the purchase of the china (Lavender ware), glass, linen and silver. Mr. Arthur Herrington of Madison, N. J., was put in charge of the Garden work and installed

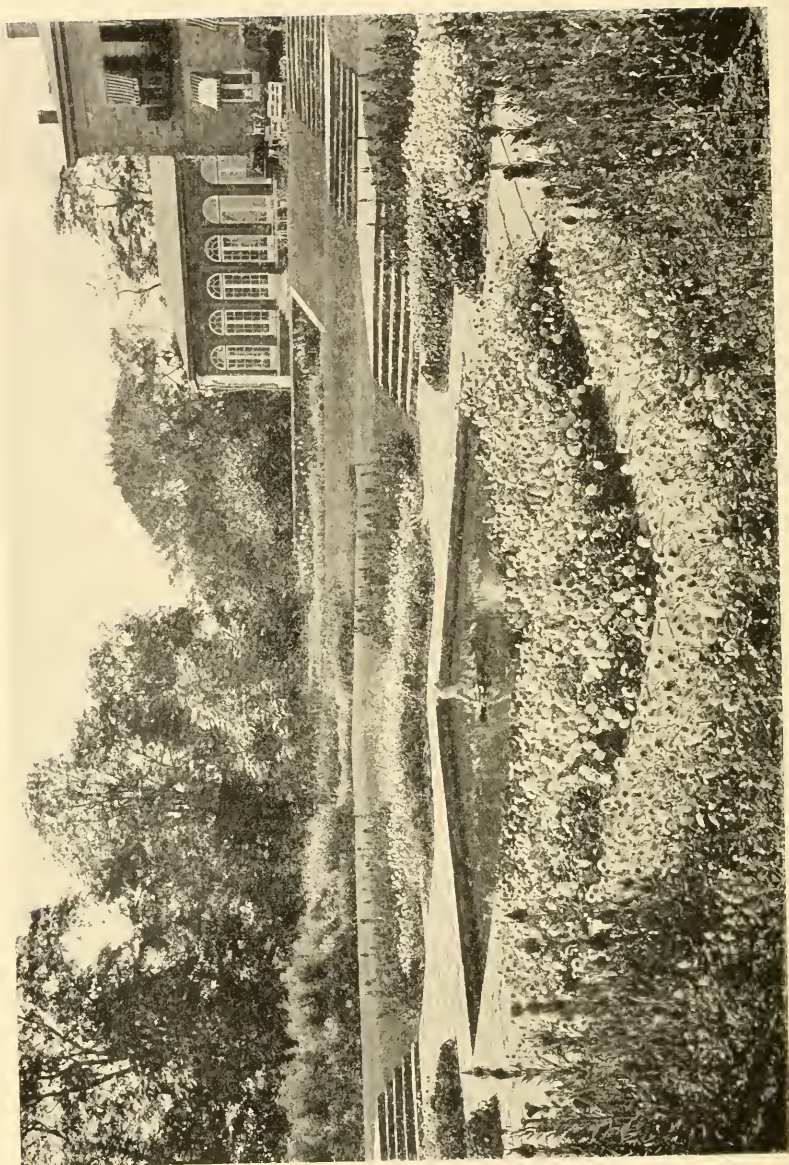


OPENING OF THE INTERNATIONAL GARDEN CLUB HOUSE, MAY 1,
1915. GOVERNOR WHITMAN, MR. RIVES, MRS. HOFFMAN,
MRS. WHITMAN, DR. BUTLER, MRS. PARSONS AND
COL. FRANCIS V. HOPPIN

James McGregor as Head Gardener and J. Wright was put in charge of the Club House as steward. The Club opened with about four hundred members. It was an experiment but it has proved a successful one. While many things remain undone, the Club has doubled its membership in the two years since its foundation and bids fair to continue this increase, and it is hoped, with the termination of the war, the carrying out of its many projects will be resumed.



CHINA ASTERS AT THE INTERNATIONAL GARDEN CLUB,
SEPTEMBER 1915



AUTUMN BLOOM
INTERNATIONAL GARDEN CLUB
SEPTEMBER, 1915

Last June, 1916, an ambitious attempt was made to give the first Open Air Flower Show held in New York City, an account of which appears elsewhere in this issue of the JOURNAL. The large growers were greatly interested in this effort to establish the Flower Show as it is held abroad, and were most enthusiastic in their response. The members of the Club responded by generously offering prizes as did the private Gardens and a beautiful show resulted which was held for four days. Unfortunately the show was not well advertised and the Public did not respond as is so often the case over here, until it learns to appreciate such opportunities. It was found especially interesting and educational for the Garden Clubs from various parts of the country to send exhibits, however small, of the work they are doing and to show photographs of the gardens of their vicinity.

Many persons distinguished in Horticulture have been entertained at the Club since its opening two years ago, and it is quite frequent to find as many as sixteen Presidents or other officers of Garden Clubs from New Jersey, Connecticut, Long Island and around New York, and even from Michigan and farther west, with well known Garden authors attending a popular lecture at one of the Club afternoons.

Some notable lectures have been given, one of the most beautiful being that of Mr. Charles H. Totty of Madison, N. J., on Chrysanthemums in the autumn of 1915. A wonderful display of Chrysanthemums arranged through the Club House, each vase tagged with the name of its particular variety gave the members a rare opportunity of seeing each specimen as Mr. Totty spoke of it. One hundred and fifty members were present at the lecture and the Club House presented a charming sight on this gray November afternoon with the fires burning brightly, the superb blooms and the tea tables under the brilliant lights. Over one hundred notable lectures have been given since the Club started two years ago, and the Executive Committee feels greatly indebted to that large company of Horticulturists who have so willingly given of their valuable time to help on the new movement to

make gardening more popular and spread the knowledge of Horticulture.

About one hundred thousand dollars have been spent on the Club House and grounds to date. A campaign to raise funds for the building of a Rose Garden modelled after those near Paris of Bagatelle and the Roseraie de l'Hay, had just been started this spring when we entered the war, and the site of the Rose Garden will be for the present planted to vegetables. The grounds of the Club will be offered to the Westchester Red Cross Society for Open air hospital purposes in case a large number of wounded should come to us.

One of the buildings and essentials which has been and is greatly needed is a greenhouse. It is hoped that one of our members will donate one as our producing powers would be greatly increased thereby.

The Annual Spring Meeting of 1917 was held with great success on Saturday, May 19, the only warm and fair day of the spring being vouchsafed us. The Boy Scouts of the Bronx gave us a most interesting exhibition of their drills and the Westchester Red Cross sent an ambulance with a Field Work Exhibit. The Woodcraft League also was represented. Over one thousand persons were present.

Owing to the breaking out of the war in Europe in 1914 our commission to purchase valuable garden books in Europe has been delayed and the library has remained stationary until this winter when our efficient new Chairman has put life into the Committee and added books to the shelves. We hope in spite of the war some of those valuable old books on the other side may yet find their way over. The editor of the JOURNAL intends to help in choosing our periodicals, will make exchanges and improve the list to what it should be.

Mr. Norman Taylor of the Brooklyn Botanic Garden has been appointed Editor of the JOURNAL and the President hopes that this periodical will become of increasing value to Americans as the years go on and we get more original articles from our own Horticulturists. Until we investigate, we have no conception of what valuable Horticultural work is going on



INTERNATIONAL GARDEN CLUB



INTERNATIONAL GARDEN CLUB
(BEAUTIFUL OLD COLONIAL HALL AND STAIRCASE)

in this country and it is usually to be read of only in the European Horticultural Journals. We are gradually establishing secretaries for the various States and foreign countries. We are fortunate in having Mr. George B. Dorr to represent Maine through our chairman for Maine, Mrs. Gardiner Sherman. He has promised us an article which we hope will appear in our next issue. Indeed he represents all that part of the country called "Arcadia" and much that is historical adds to the interest of his work. Professor Sargent we hope to have for Massachusetts and to have his contribution for subsequent issues. Mr. John Muir was our correspondent for California and one of our first members of the Club and we deeply regret his loss. Mrs. William Crocker, Chairman for California, has promised to find us a correspondent worthy of the state. There will be necessarily many blanks among the states at first and because many who have been written to have not yet had time to reply, we shall not publish the list of names until the next issue of the JOURNAL. It will be interesting to see how they fill up as time goes on. Alas! Europe has no time to send us garden articles now but the Club has become the representative of the Royal Horticultural Society's Belgian Fund, and we look forward to the future and to a Peace which will bring the nations together for better purposes than War, "Gentes Floribus Intertextae."

Philippe de Vilmorin



HILIPPE LEVEQUE DE VILMORIN, probably the most celebrated figure in European horticulture, died on June 30, according to press dispatches. The following account of this truly remarkable man has been drawn from Professor Sargent's appreciation of him in *Horticulture* for July 14, and from the New York *Evening Post*.

Philippe de Vilmorin was born at Verrieres-le-Buisson, near Paris, in 1872 and on the death of his father, Henry, in 1899, became head of the house. The first of the Vilmorins, also Philippe, who is known to have been interested in plants, was born in 1746 and went as a boy from Lorraine to Paris to study botany and became acquainted with Pierre d'Andrieux, a seedsman and botanist to Louis XV, whose shop was on the Quai de la Megisserie on the site of the building still occupied by Vilmorin-Andrieux et Cie.

A reserve officer in the French army, he had been attached to the Anglo-Indian army but no particulars were given of his death. His closest scientific affiliations were with William Bateson, of England, whom he regarded as his mentor, and J. P. Lott, the Dutch botanist. He was secretary of the last International Conference on Genetics, and a life member of the American Genetic Association.

The fact is interesting that the relations of the Vilmorin family with America date from the time of the first Philippe who, being a friend of the French botanist Michaux sent by the French Government late in the eighteenth century to explore the forests of eastern North America, was able to cultivate successfully in France many American trees. The first Philippe de Vilmorin died in 1804 and was succeeded by his oldest son, Pierre Philippe-Andre, who was born in 1776 and lived until 1862. It was he who created the Arboretum at Les Barres,

now one of the French Forest Schools, where he made interesting experiments to prove the value of different geographical forms of important forest trees.

One of Philippe de Vilmorin's great services to genetics was the organization of the Fourth International Conference on Genetics, held in Paris, September 18-23, 1911. This conference was made possible largely by the de Vilmorin family, which furnished most of the necessary funds. Philippe was secretary, and on him fell a large share of the expense as well as work connected with meetings, entertainments, and publications. He issued for distribution to the members, a pamphlet giving a brief history and bibliography of genetics, had bronze medals made for the foreign delegates, and edited the large volume of proceedings, the cost of publishing which was defrayed by him personally.

The breadth of his interest and information is shown by a publication on the beet-sugar industry of the United States, another on the culture of ginseng in Korea and Manchuria, and another on the tobaccos of commerce. He took a keen interest in flower gardening, and was responsible for three important publications of the firm: *Les Fleurs de Pleine Terre*, *Le Manuel de Floriculture*, and the *Hortus Vilmorinianus*. The two first are standard works on flower gardening in Europe, while the third is a large and valuable report on the appearance and behavior of little-known plants.

Philippe de Vilmorin was a member of the Paris firm of Vilmorin-Andrieux & Co., one of the most celebrated seed-growing and seed-selling establishments in the world, which was founded in 1727 in the French capital by Pierre Geoffroy, and handed down from father to son. Many de Vilmorins have, in every generation, been identified with the progress of scientific agriculture in France, but none is so well known as Louis de Vilmorin (1816-1860), the producer of the sugar-beet. Starting with a sweet yellow beet from Germany, he analyzed many roots, selected those which had the highest sugar content (from 10 per cent. to 12 per cent.), and planted separately the seeds borne on each root. From the rows which produced the best

yield, he again selected the roots with highest sugar content, and so continued until he had raised the average yield to about 18 per cent., a figure which has hardly been surpassed since his time. By growing this strain of beets, continental Europe was able to make sugar in competition with the cane-growing countries of the tropics.

This Philippe de Vilmorin, like all the members of his family, was a great traveler and a remarkable linguist. He came several times to this country, the first time as a boy with his father. He has more than once been around the world and was once in the Soudan, these journeys having been undertaken in the interest of Vilmorin-Andrieux. He is the author of several books published before the war, the most important perhaps being his catalogue of plants cultivated at Verrieres, the family home near Paris where there is one of the most interesting collections of trees in Europe gathered by four generations of Vilmorins, and large collections of flowering shrubs and alpine plants in which Philippe de Vilmorin was particularly interested. During the war he has lived chiefly in London where his knowledge of the principal European languages, his charming personality and his many friends have made his services valuable to the English Government.

In the article on the history and development of the strawberry in this number of the JOURNAL there is a discussion of what part the Vilmorins have played in the cultivation of that fruit. M. Henri de Vilmorin was the father of Philippe Leveque de Vilmorin.

Horticultural Notes

Cultivation of Rhododendrons

When the soil is very unsuitable for Rhododendrons, it is a good plan to make a raised bed of prepared soil for them on the surface of the natural soil, making the bed not less than 18 inches deep. (Rhododendrons are shallow-rooting plants). These plants revel in a heap of rough leaf soil, such as may often be found in a wood. Rhododendron's so planted must not be allowed to suffer from lack of water. Although leaf-soil and peat retain moisture well, water escapes more quickly from a raised mound than from a level surface.

Pruning Rhododendrons

Rhododendrons should not be cut back with shears but with a sharp knife, taking the projecting branches one by one cutting them well back two or three feet, or within six inches of a main stem of some three or four years' previous growth. This will lead to a thickening of the bush. The cutting should be done immediately after flowering, if it cannot be done before, and stems uncut should have the old flower heads picked off, especially in the case of young plants.

Raspberries

Everyone who wants to grow Raspberries for summer use, must make up their mind to having no crop at all the first year. The Canes should be planted early in November, in well-manured land, and cut down to within three inches of the ground in early February the next year, when they will throw up fairly strong shoots to bear fruit the following year—i.e., 18 months from the planting. If, on the other hand, the Canes are not cut the first February after planting, they will bear a small crop of inferior fruit and hardly throw up any Canes at all for the following year when again the crop will be small and inferior, and the Cane will with difficulty be established at all.

In dealing with an established plantation, the Canes which have borne fruit in July, should always be entirely cut down by the end of the month when all the fruit has been gathered. This will strengthen generally the new Canes being thrown up, and increase the crop of the next year.

Autumn fruiting Raspberries require a slightly different treatment. They should be entirely cut down every December, and the new Canes thrown up in the spring will bear fruit the following autumn. "Queen Alexandria," and "Colonel Garbord," are good autumn varieties.

Remember that Raspberries are very shallow rooters and consequently require a damp or slightly shaded position, or what we gardeners call "a cool spot." Also in consequence of their roots being so near the surface a spade should never be allowed anywhere near them from the day they are planted to the day the whole lot are dug up for the bonfire. A hoe is all that is needed. They are also very gross feeders and like a liberal mulching every year in March, and a soaking with water in a hot June.

Manure for Asparagus

The following artificial manure has been used on Asparagus beds with satisfactory results: apply in February 6 pounds Superphosphate and 15 pounds of Kainit per 40 square yards; and 1 pound Nitrate of Soda to the same area each week from the time the Asparagus begins to appear until the cutting has ceased for the season. (This date should not be later than June 30.)

To Succeed with Annuals

1. Many people fail to get a good display of flowers by not sowing early enough.

2. Another reason, and one even more prolific, of harm, is sowing the seed too thickly; or, 3, too deeply; and

4. Not thinning out the young plants soon enough; or 5, sufficiently.

6. Many people again do not think Hardy Annuals worth taking any trouble about, little knowing the exquisite beauty that many of them return for really but little pains bestowed—that little, however, they must have and at the right time.

7. For sowing choose a fine open day (free from frost), when the ground works well, and rake the surface over.

8. Mix small seeds with five or six times their own bulk of dry sand so as to make it easier to sow thinly.

9. As soon as the seedlings are large enough to handle, thin them out well, allowing each one ample room to grow and expand to the full according to the known size to which the plant in question grows. It is worse than useless to thin after the plants grow leggy. If the thinning out is done carefully and early enough, many of the youngsters can be re-planted elsewhere if done immediately.

10. In dry weather, give the Annuals a thorough soaking once a week.

11. Some Annuals thrive better in calcareous soil than in one that is rich in humus, e.g., Mignonette and Portulaca. Others have the reverse propensity, e.g., Asters and Marvel of Peru. As a rule a soil that is rich in humus tends to, and fosters growth rather than flowers in the case of Annuals, e.g., Mina lobata and the climbing Nasturtiums.

Artificial Manure

All fruit trees and bushes needing support will be benefited by an application of 4 ounces of Basic Slag and 1 ounce of Kainit per square yard, as far as the roots extend, in the Autumn; followed by 2 ounces of Superphosphate and 1 ounce of Sulphate of Ammonia in March or April. There will then be conveyed to the soil Lime, Phosphates, Potash, Nitrogen, Magnesia, and a little Iron. In chalky soils or dry "hot" land, Nitrate of Soda may be used instead of Sulphate of Ammonia, but a little later, or when the blossom buds are expanding; another dressing may follow if trees are heavily set with fruit. These dressings may be increased somewhat or diminished according to the condition of the trees. It is of small use applying Basic Slag and Kainit late in the spring, as they are not dissolved in time for appropriation by the roots during the current season.

Soot, and wood or bonfire ashes, spread over the surface with a little lime form an excellent manure for Apples—indeed, for all fruit trees.

Lime

A few plants, such as rhododendrons, heaths and bog plants, do not thrive where lime is present, but most thrive the better for it. Soil acidity is not only detrimental to the welfare of most plants but is a condition enjoyed by countless fungi and revelled in by many insect pests. The remedy for soil acidity is lime. Lime is also useful in making heavy clay more open and in helping to bind the loose particles of a sand soil and in other ways. To test a soil for lime, take samples from several parts to a depth of 9 inches and mix them thoroughly. Put a part of the mixture in a glass or cup and mix to a thick paste with a little water, then add a teaspoonful of spirits of salt (hydrochloric or muriatic acid). If effervescence occurs there is sufficient lime in the soil; if not, lime should be added. A soil overlying chalk or limestone may contain no lime.

In liming a heavy clay soil, put good white quick lime (also called unslaked, lime, stone lime, builder's lime) in heaps at the rate of half bushel to the square rod ($30\frac{1}{4}$ square yards), cover it with earth, leave it for ten

days or so, then spread and dig it in. (Do not put lime on at the same time as stable manure or similar things.) On lighter soils use powdered chalk (up to a bushel to the square rod) or powdered shell. The dressing may need renewal after five years.

Lime as an aid to Animal Manures

The presence of lime in a kitchen garden is a real essential to general good cultivation. It is not only a plant food, in itself important for certain subjects, but its action on animal manures is most beneficial, rendering them far more easily available for the growth of green crops. *Slaked* lime should be applied at the rate of half a bushel to every square rod of the garden or a little less than this amount if the soil is very light or a little more if it be very heavy.

Manure for a Herbaceous Border

When, as is sometimes the case, it is undesirable for some reason to dig a border and work in stable manure the following mixture may be applied in March, at the rate of 2 ounces of Kainit and 1 ounce of guano per square yard. Immediately afterwards, mulch the border with well-rotted manure; this will supply humus to the soil, assist the retention of moisture, keep the roots cool, and do away with the necessity of digging.

Manure for Fully Grown Apple and Pear Trees

For Apple Trees:

1½ lb. sulphate of ammonia.....	} end of March.
1½ lb. muriate of potash.....	
3½ lb. basic slag.....	

Pears:

3 lb. nitrate of soda.....	} early in April
2¼ lb. muriate of potash.....	
5 lb. basic slag.....	

To be scattered over the surface of the ground in a circle extending a couple of feet beyond the radius of the tree's branches, and then lightly hoed in.

Fruit and Other Trees in Pots

Pots, 12 inches or 14 inches in size, are generally most suitable for the cultivation of pot fruit trees and flowering shrubs of 4 feet to 6 feet in height. Repot at least every two years. The compost should be well prepared to meet the requirements of the subject to be grown, and liquid and artificial manures should be given during the growing and especially during the fruiting season. During late spring and early summer, the pots are best plunged in ashes as by doing so a more even condition of moisture at the root is maintained.

Hints on Potting Plants

1. The pots should be absolutely clean and dry. Plants to be repotted should be allowed to go a little dry as they then turn out more easily on their pots being tapped upside down.

2. Well crock the bottom, and place a few oak or beech leaves on the crocks before adding any soil.

3. The soil should be sifted with a fine sieve to free it from over coarse material. It should be sufficiently dry to leave the hands without sticking to them in the least.

4. If potting up, or repotting, be careful to disturb the roots as little as possible. In the case of repotting, any congestion of fibrous roots at the base of the transferred plant should be corrected by carefully liberating the rootlets from their tangled state—this operation must not be carried too far. Add sufficient soil at the bottom of the pot to bring the upper level to reach the roots of the new plant, and then holding the plant in the left hand, shake the further soil around the roots and firm the soil.

5. The compost of the potting should be suited to the requirements of the plant to be potted. Good loam is essential. The best loam is the top spit of an old pasture from the hills or upland of a grazing county. It should have some lime in it. The addition of old mortar rubble is generally an acquisition, Rhododendrons and Azaleas excepted. Decomposed leaf-soil is a good addition—oak and beech leaf-mould is the best.

Rose Pests and their Treatment

ROSE MILDEW.—A white fungus growth on leaves, “muggy” weather particularly favourable.

Treatment.—Spray affected plants as soon as whiteness appears, with a solution of 1 ounce potassium sulphide in 3 gallons of rain water. In win-

ter examine wood and remove any white mouldiness that may be present; also old heps.

BLACK MILDEW.—Rare. Leaves fall rapidly. Young shoots droop and die. Blackish or dark red stains apparent; leaves look as if attacked by red spider.

Treatment.—Drench plants with Cupram, and dust thoroughly whilst wet, with flowers of sulphur. Repeat after two days.

ROSE DUST.—Deep orange fungus on wood and leaves—on leaves usually small patches. Very common on briars.

Treatment.—In autumn collect all leaves bearing the rust and burn them. When leaves are opening spray with a solution of 1 ounce of potassium sulphide in 3 gallons of rain water.

BLACK SPOT.—Circular black or purplish spots on leaves, $\frac{1}{4}$ inch diameter.

Treatment.—Remove diseased leaves and collect those on the ground and burn them. Spray with potassium sulphide as above.

ROSE LEAF SCORCH.—A fungus. Minute yellowish-green patches over the surface of the leaf; enlarging, they change to a pale brown colour surrounded by a dark line. Sometimes patches fall out and leave holes.

Treatment.—Take preventive measures at once before spots fall out from leaves. Collect all affected leaves both on tree and on ground, and burn. In spring spray with liver of sulphur when leaves half grown, and repeat if necessary later. Drench surrounding earth in winter with sulphate of copper solution—1 ounce to 2 gallons of water.

ROSE CANCKER.—Fungus growth generally on stems; commencing on wood one year old.

Treatment.—Paint the red patches with creosoted Stockholm tar. If branches affected, remove and burn them.

COCKCHAFFER.—A very well-known beetle, one inch long, black head, wing cases reddish brown and hairy, each with four raised lines. Abdomen has black and white marks at sides.

Treatment.—Beetle eats leaves and blossoms; the grubs eat the roots. The grub is creamy white, thick and fleshy, tail end swollen into a dark bladder-like sac. Found when digging. Destroy them; catch beetles.

LEAF-CUTTING BEE.—Cuts semi-circular holes in leaves commencing from the edge.

Treatment.—Only cure is to discover the nests and destroy them at dusk when the makers are safely housed within,

LEAF-ROLLING SAWFLY.—Very prevalent. Leaves roll up cylindrically from both edges to the centre rib. Within are one or more pale greyish-green or grey larvae.

Treatment.—Hand pick folded leaves when first seen and destroy them. Spray at once with nicotine, or hellebore wash. Remove surface soil in winter, and either deeply bury it or burn it, replacing fresh mould.

ROSE SLUG WORM.—Larvae of a Sawfly, pale yellowish-green; devours upper skin and tissue of the rose foliage, leaving the lower. Leaves blotch, turn white, then brown and shrivel up.

Treatment.—Spray with nicotine or hellebore wash. If attack is bad, remove the surface soil as in the last case.

COMMON ROSE SAWFLY.—The larvae start at the edge and eat down to the mid-rib of leaf. When full grown they sometimes enter branches and kill growth above them.

Treatment.—Treat as for slug worm. The larvae eat into the branches and form a cell in which they live till the following spring. It is important to *burn* all rose prunings, for this and similar reasons.

ROSE SHOOT-BORER SAWFLY.—Dull yellowish white. Eggs laid on tips of shoot. After hatching out, the grub at once bores down the pith of Rose shoots for from $1\frac{1}{2}$ inches to 3 inches.

Treatment.—Affected shoots droop and die. Hand pick at once before grub escapes and burn.

APHIS.—Commonly called Greenfly. They suck the sap of young, growing stems.

Treatment.—Syringe as often as necessary with 2 ounces of carbolic soft soap dissolved in 1 gallon of warm water. Apply warm. Or Syringe with Abol.

N.B.—The little red and black lady bird, and its dark larvae which remind one of minute reproductions of some antediluvian reptile, are friends to the gardener as they feed on the Aphis and do no harm to plants. They should therefore be encouraged in the garden, and on no account destroyed.

SPRAYS AND WASHES

Spraying

January and February.—Wash fruit and ornamental trees with Caustic Alkali to destroy insect life; and paint roses, peaches and other shrubs or trees with Blue Water to destroy fungus spores.

April and May.—Spray fruit trees after the bloom has set with Arsenate of Lead; spray Paraffin Emulsion on roses and plants subject to aphid and caterpillars; Ammoniacal Copper Carbonate on peaches for fungoid diseases.

June, July, August.—Spray Potatoes with Bordeaux Mixture.

Caustic Alkali.

The best formula is, 2 pounds Caustic Soda (98 per cent) to 10 gallons of water.

CAUTION.—Choose a day with as little wind as possible for spraying this solution. Wear a very old suit of clothes and glove the hands and wrists in rubber. The solution is injurious to skin and clothing.

Paraffin Emulsion

For use on dormant trees only in winter:

Paraffin (Tea Rose or Solar Distillate)	1 gallon.
Soft Soap.....	1½ pounds.
Water.....	10 gallons.

Dissolve soft soap in some boiling water, add paraffin, and churn together with a syringe into a creamy mass. Add water to make up quantities given above, stirring well meanwhile.

For use in summer:

Paraffin (Tea Rose or Solar Distillate).....	2½ pints.
Soft Soap.....	¼ pound.
Water.....	10 gallons.

Blue Water

Dissolve 1 pound of sulphate of copper in 3 or 4 gallons of warm water. When completely dissolved, and the water has cooled, add 1 pint of liquid ammonia. This concentrated liquid should be kept in a keg or some other *wooden* vessel, and diluted when required for use to 22 gallons, or a smaller quantity proportionately.

Bordeaux Mixture

Dissolve 6 pounds copper sulphate by placing it in a loosely woven bag and suspending it in about 20 gallons of water in a wooden vessel over night. Slake 4 pounds quicklime in another vessel, adding water gradually at first until the lime has crumbled to a powder, then in greater quantity, so as to form a milk. When cold, and not before, strain this through a piece of coarse cloth, adding it to the copper sulphate solution, constantly stirring meanwhile. The addition of the milk of lime should be stopped, when on adding a drop or two of a solution of potassium ferrocyanide to a little of the mixture in a white saucer, no red colour is produced. The mixture is not fit for use until the addition of a few drops of ferrocyanide of

potassium produces no red colour, and it is unwise to add more lime than is required to act on all the copper. Care should be taken that the copper sulphate and lime are of the best quality. Many failures are undoubtedly due to the use of bad, impure materials. Make up with water to 40 gallons. The mixture should be of a blue colour when properly made and it should be made afresh as required. Use at half this strength on apples and pears.

Sulphur

This is used as a dry powder in the condition known as "flowers of sulphur." Most effective for Hop mildew, Rose mildew, and Pea mildew. Sometimes finely powdered quicklime is mixed with the sulphur. Black sulphur is less conspicuous than yellow.

Lime-Sulphur Spray

Many formulae for the making of this have been tried, but the following has proved useful, both as a fungicide and as an insecticide:—Place 8 pounds of fresh pure quick-lime (unslaked lime) in a wooden barrel large enough to hold 50 gallons and pour on it enough hot water to cover it. Then, as soon as the lime begins to slake, pour in 8 pounds of flowers of sulphur, breaking any lumps and stirring it to make a thorough mixture. Add a little more water if necessary. Cover with canvas or sacking to keep in heat, and allow to boil for 15 or 20 minutes, stirring occasionally. Make up to 50 gallons with water. Do not use a copper spraying outfit.

Arsenate of Lead

For caterpillars and other biting insects and grubs, dissolve $\frac{1}{4}$ ounce of arsenate of soda in a little hot water, and mix it with 4 gallons of soft water. Also dissolve $\frac{3}{4}$ ounce of acetate of lead in water and add to the first solution. Then stir $\frac{1}{2}$ pound of thick treacle into the whole in order to give it an adhesive quality, and syringe infested subjects.

Arsenate of lead can, however, be now easily obtained in paste form ready for mixing with water. It has now, to a great extent, superseded Paris Green as a spray.

Tobacco Wash

Infuse 3 pounds tobacco powder or $\frac{1}{2}$ pound tobacco leaf in water for about six hours, then strain off and press the tobacco and infuse again. Add the extract to $\frac{1}{2}$ pound soft soap dissolved in water and make up to 10 gallons with water.

Potassium Sulphide Solution

Dissolve 1 ounce of potassium sulphide (Liver of Sulphur) in 3 gallons of water. Store in a sealed or stoppered vessel.

Quassia and Soft Soap Solution

Simmer or gently boil 1 pound of Quassia chips in water for a couple of hours. Dissolve $\frac{1}{2}$ pound of soft soap in warm water, and stir in the strained off Quassia extract, adding sufficient water to make up 10 gallons.

Cupram

Copper carbonate dissolved in ammonia forms a fungicide known as Cupram. There are various formulae for making it; one is:

Copper Carbonate.....	1 $\frac{1}{4}$ ounces.
Strong ammonia.....	16 liquid ounces.
Water to make up to.....	10 gallons.

Dilute the 'ammonia with 12 pints of water, and shake it up with the carbonate till this is all dissolved, then add the rest of the water. This has not proved to be such a satisfactory fungicide as Bordeaux mixture, but the danger of scorching the foliage with it is less.

Scheme for a Border

For a back row plant at 6 feet apart such tall subjects as the tallest Michaelmas daisies, the most vigorous Delphiniums and *Helianthus*, and at 4 to 5 feet apart the yellow *Thalictrum glaucum*, blue Monkshoods, scarlet Tritomas, the second sized Michaelmas daisies, the feathery-white *Spiraea Aruncus* and *acuminata*, *Bocconia cordata*, *Centaurea macrocephala* and *orientalis*, the white *Pyrethrum uliginosum*, *Crambe cordifolia* with its hundred minute white flowers, the primrose *Cephalaria tatarica*, the white *Chrysanthemum maximum*, the steel-blue *Echinops Ritro* and *nivalis*, yellow *Heliopsis*, Hollyhocks, Mulleins, the orange-yellow Rudbeckias such as *nitida*, Autumn glory, and Golden glow, and *Solidago* (the Golden rod); mingling with them by way of contrast Eulalias, the Giant Reed (*Arundo Donax*), and some of the taller lilies such as the orange *Henryi*, the creamy-fawn coloured *testaceum*, orange *croceum*, the yellow *colchicum*, and the common white Madonna Lily. The lilies with the exception of the last, will benefit by being planted in a little pocket of mingled leaf-mould, peat, and sand.

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No. 2

CONTENTS

Editorial Note.....	291
May-flowering Tulips and How They May Be Planted, by John Scheepers.....	293
Recent Investigations on the Production of Plant Food in the Soil, by E. D. Russell.....	317
A Garden of Ten Centuries, by F. A. Arnold.....	349
Arnold Arboretum Notes, by C. S. Sargent.....	361
A Guide to the Literature of Pomology, by E. A. Bunyard.....	381
The Foxtail Lily, by T. A. Havemeyer.....	431
Aquatic Gardening, by George H. Pring.....	435
Tree Surgery, by Alexander Lurie.....	457
The Best of the New Introductions for Outdoor Rose-growing, by George C. Thomas, Jr.....	473
Rose Breeding, by E. A. White.....	479
Possibilities in the Production of American Garden Roses, by Walter Van Fleet.....	485
"Plant Immigrants".....	497
Sieur de Monts National Monument and the Wild Garden of Acadia, by George B. Dorr.....	507
Plants from China.....	525
Report of the Tuxedo Horticultural Society.....	535
Flower Show at Grand Central Place in Spring of 1917.....	537
Book Reviews.....	543
Report from Library of the Club.....	557
Report from Garden Committee of the Club.....	563
Notes and News.....	571



TWO TO FOUR PERFECT FLOWERS
ON A SINGLE TULIP BULB
INTERNATIONAL GARDEN CLUB, BARTOW

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Note



THIS number completes the first volume of the JOURNAL. During 1918 and thereafter it will be issued quarterly in March, June, September and December. Those who wish to bind their copies of Volume I will be supplied with title-page and table of contents in the next issue of the JOURNAL if they apply to the editor before February first.



TULIPS AND MYOSOTIS ON A BANK
WITH EVERGREEN BACKGROUND
G. D. PRATT, ESQ., GLEN COVE

May-Flowering Tulips and How They May Be Ad- vantageously Planted

By John Scheepers, New York



WHSOEVER loves the pure brilliancy of rich nuances, the gay color so dear to the futurist and again the refinement of pastel shades, combined with the stately way in which such a full range of colors is produced, will find nothing finer than May-flowering tulips. You may want a striking bank of color, a border for a path, solid masses in bed formation to come suddenly upon from behind a clump of evergreens; or you may want to display rare colors in colonies in the hardy borders; or desire to brighten up a certain particular spot; put a little life into the immediate surroundings of a quiet restful pool; May-flowering tulips, through their great variety in form and color, their majestically proud bearing and elegant, graceful habit, will be found indispensable. What greater range of colors could a landscape architect, an artist, a flower lover, ask for, than those of the yellow, in pale and gold shades, pure and distinct, or slightly flamed; orange in many nuances; scarlets, lilacs, heliotropes, blues, flesh, rose, violet, white, variegated and purples in various shadings to black; the most stunning color effects can be created.

The results of plantings of May-flowering tulips are of course very largely dependent upon the use of good taste in the arrangement of the varieties; but the range of colors is so wide, that the various charming harmonies, or striking contrasts possible to the planter will never be exhausted.

The best effects generally fall under one of the three following headings:

I. Contrasts in Two Colors

These may be bold, as when rich yellow is placed with deep purple or crimson; or soft, as when cream is placed with lavender; lavender with pink or pink with pale yellow.

II. Harmonies

Two or three closely related shades; e.g., silvery lilac and heliotrope; blood-red and maroon.

III. Color-scales

Indefinite series of varieties planted in order of color tone.

The following ten groups form a simple guide for this purpose:

“Breeder” and “Darwin” Tulips

Take distinct varieties and group them into three divisions, arranging them in a series, showing gradually intensifying colors. The *palest* shade is in each case placed *first*, and all the colors in any one group harmonize with one another.

Group One

White through lilac, mauve, heliotrope, and purple to darkest maroon.

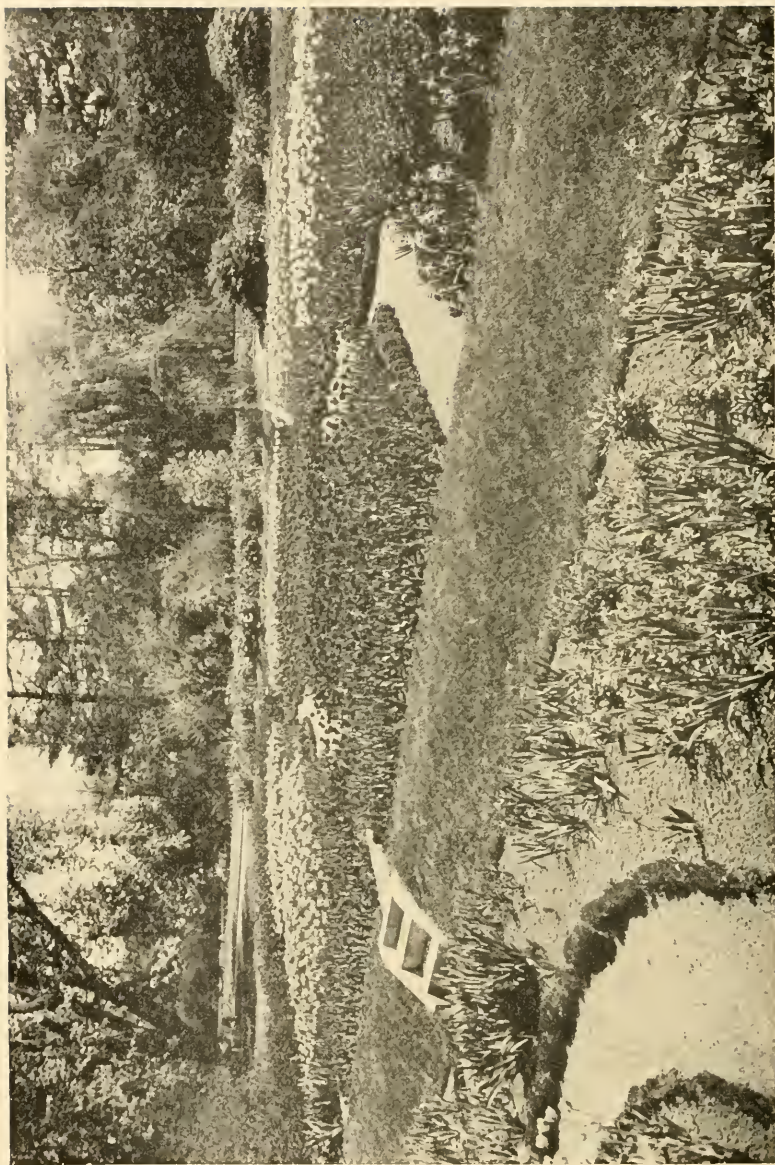
White. For instance, La Candeur. *Silvery lilac.* Painted Lady, Lantern, Margaret. *Lilac.* Mrs. Cleveland, L'Ingenue, Suzon, Fanny, Electra, Dal Ongaro, Mauve Claire, *Heliotrope.* Dream, Crepuscule, Erguste, Rev. Ewbank, Remembrance, Euterpe, La Tristesse. *Purple.* Bleu Aimable, Corydon, Melicette, Grand Monarque, Frans Hals, Fashion. *Purple Maroon to Plum Black.* Paul Boudry, Faust, Zulu, La Tulipe Noire, Sultan.

Group Two

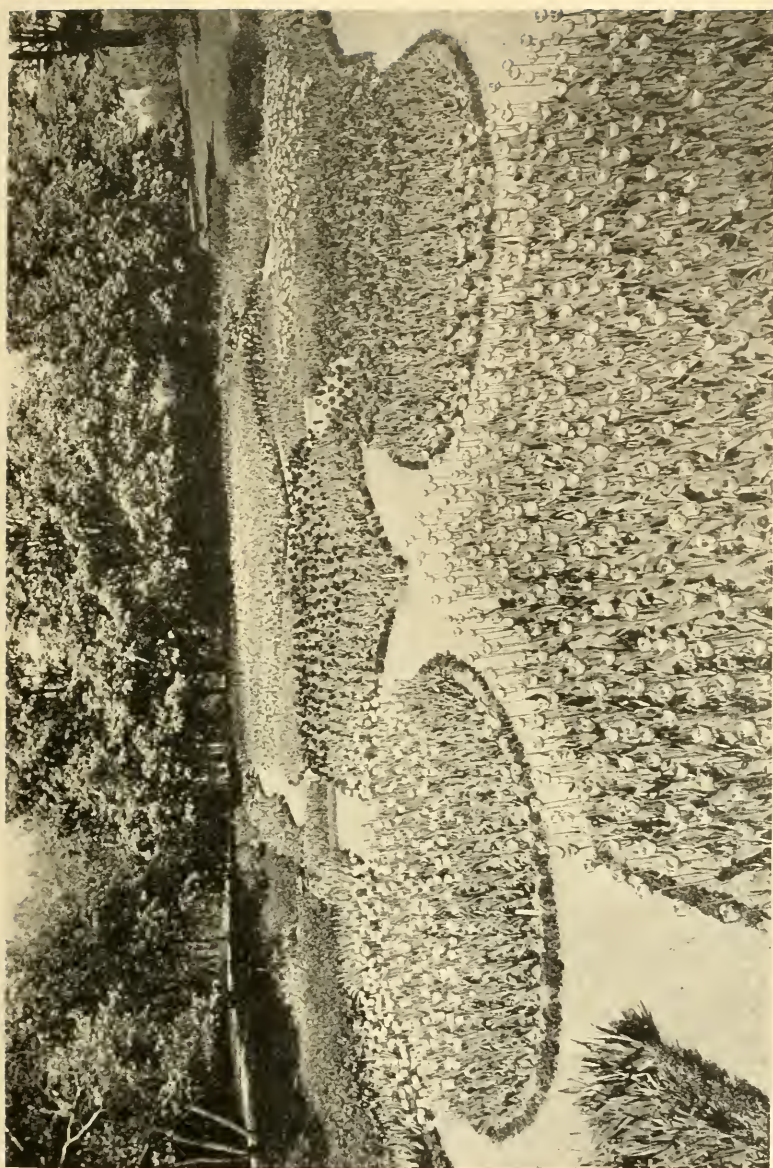
Rose pink to deep purplish rose. Clara Butt, Maiden's Blush, Baronne de la Tonnaye, Psyche, Madame Krelage, Anton Roozen, Loveliness, Bleu Celeste.



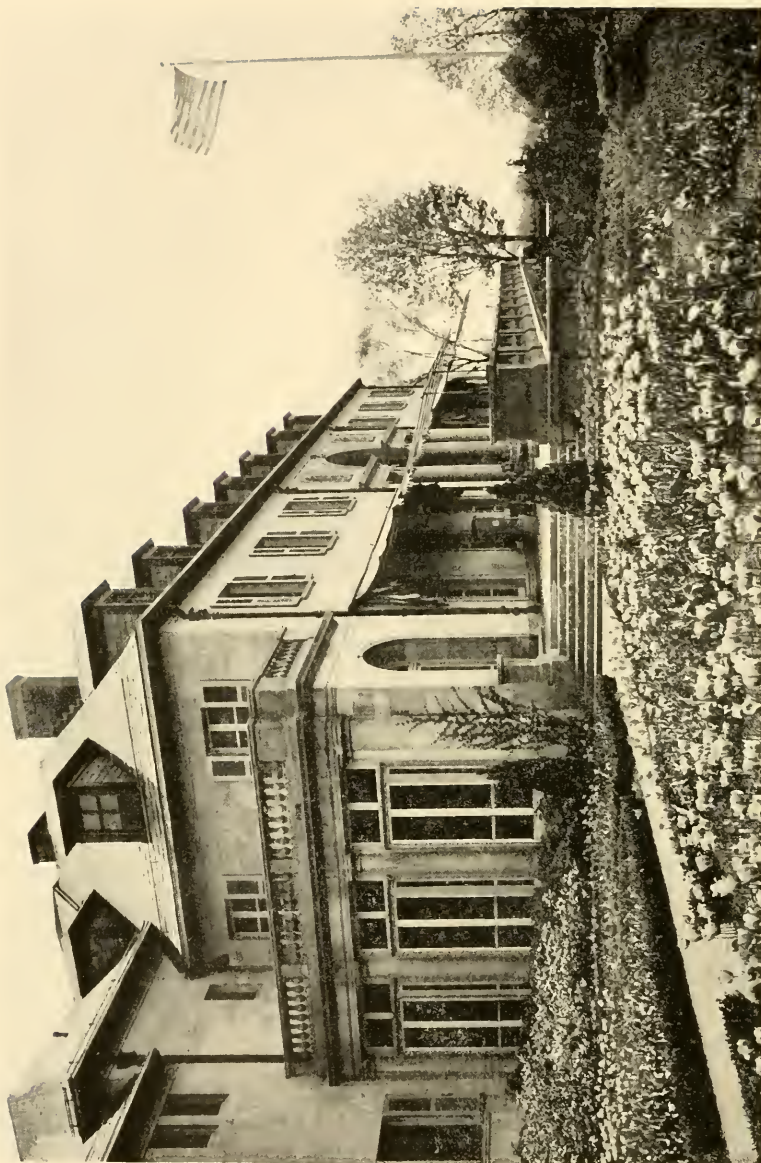
GROUPING OF COTTAGE AND DARWIN TULIPS
MYOSOTIS, AND EVERGREENS
G. D. PRATT, ESQ., GLEN COVE



TERRACE OF TULIPS AT
GREYSTONE
SAMUEL UNTERMYER, ESQ.



DARWIN TULIPS BARONNE DE LA TONNAYE, CLARA
BUTT IN FOREGROUND. SAMUEL UNTERMYER, ESQ.
GREYSTONE



DARWIN TULIP ERGUSTE (IN FOREGROUND)
WALTER B. THOMPSON, ESQ.
YONKERS

Group Three

Purplish rose, through blood-red to maroon-crimson. *Bright Purplish Rose*. Yolande, Pride of Haarlem, Professor Rauwenhoff. *Crimson Red*. Minister Takv an Poortvliet, Princess Juliana, Ariadne, Farncombe Sanders, Europe. *Blood-red*. Isis, Glow, Feu Brilliant, Whistler. *Maroon-crimson*. King Harold, Louis XIV, Velvet King.

*Cottage Tulips**Group Four*

White or white edged and flushed pink. *Carnation*, *Elegans Alba*, *Picotee*, *Pride of Inglescombe*.

Group Five

Yellow. For instance, *Avis Kennicott*, *Bouton d'Or*, *Miss Willmott*, *Gesneriana Lutea*, *Inglescombe Yellow*, *Fulgens Lutea Maxima*, *Moonlight*, *Parisian Yellow*, *Primrose Beauty*, *Retroflexa*, *Vitellina*, *W. T. Ware*.

Group Six

Yellow, edged or shaded red. *Billiettiana*, *Elegans Lutea Maxima*, *Yellow Picotee*.

Group Seven

Amber, pink, salmon. *Beauty of Bath*, *Amber Crown*, *John Ruskin*, *Eurasian*, *Doris*, *Inglescombe Pink*, *Le Réve*, *The Fawn*, all of which form a beautiful series of shades.

Group Eight

Bronze shades. Related colors to the last group but in shape and vigor nearer to the Darwin types. *Fairy Queen*; *Orion*; *Yellow Perfection*; *Bronze Queen*; *Quaintness*; and in Maroon Shades, *Don Pedro*; *Lucifer*; *Panorama*.

Group Nine

Orange. *Gesneriana Aurantiaca*, *La Merveille*, *Orange King*.

Group Ten

Scarlet to crimson. Coronation scarlet; Flame, Fulgens, Gesneriana Major, Glare of the Garden, Inglescombe scarlet, Mauriana, Red Standard, Scarlet Emperor.

The simple contrast of maroon and yellow as of Fra Angelico with Vitellina or Walter T. Ware, for example, is always effective, but the black maroons also go finely with the soft pinks, and the yellows are lovely with purple or crimson. The softer effects of the mauves with pale yellows are charming. The lavender Remembrance is very fine seen with the rose pink of Suzon, but the pale silvery lilacs need the relief of a brighter pink as of Loveliness. These silvery lilacs again go well with the slaty blues, as the pinks harmonize well with the rich crimson and purples. Such combinations are unending. In a confined space I think the best effects are produced by two colors, but where there is ample scope, the most splendid effects are produced by steady gradations of tone leading from white through pink to crimson on one hand or through lavender and mauve to purple on the other.

I can suggest amongst many the following combinations: in some cases the colors blend and in others they contrast.

Anton Roozen (rose-pink) and Edmée (cherry-rose) with a few Suzon (buff-rose) and sparing use of Philippe de Commynes (dark purple).

Clara Butt (delicate rosy pink) and Loveliness, or Primrose Beauty, dotted through.

Dream (heliotrope) dotted with Velvet King (royal purple).

Euterpe (silvery mauve-lilac) and Bronze Queen (buff).

Farncombe Sanders (rosy crimson) with Suzon (rosy-pink).

Flamingo (soft pink) and Ellen Willmott (pale yellow).

Flava (pale yellow) and Mrs. Kerrell (blend of amber and light rose).

Isis (bright red) and Walter T. Ware (deep yellow).

La Tulipe Noire and Gesneriana Lutea (yellow).

Margaret (pale rose) and The Sultan (maroon black).

Massenet (apple blossom pink) and Louis XIV (deep purple edged brown).

Mrs. Moon (yellow) and Erguste (mauve).

Prince of the Netherlands (rosy carmine) and La Tristesse (slaty blue).

Professor Rauwenhoff (rosy-red) and La Tulipe Noire.

Reverend Ewbank (lavender violet) and Moonlight (pale yellow).

Sir Harry (mauve pink) and Gesneriana Lutea Pallida (yellow).

Sophrosyne (rosy-pink) and Paul Boudry (brown red).

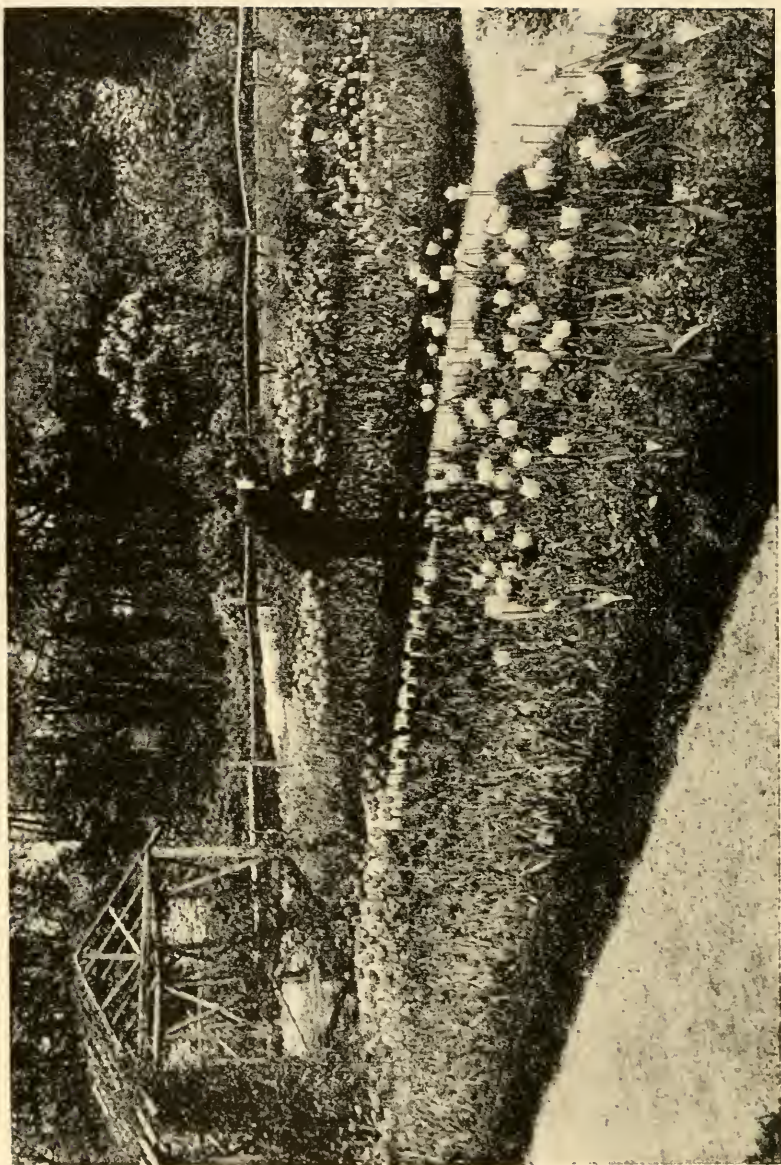
Suzon (rosy flesh) and Bleu Aimable (heliotrope).

Walter T. Ware (deep yellow) and La Tulipe Noire.

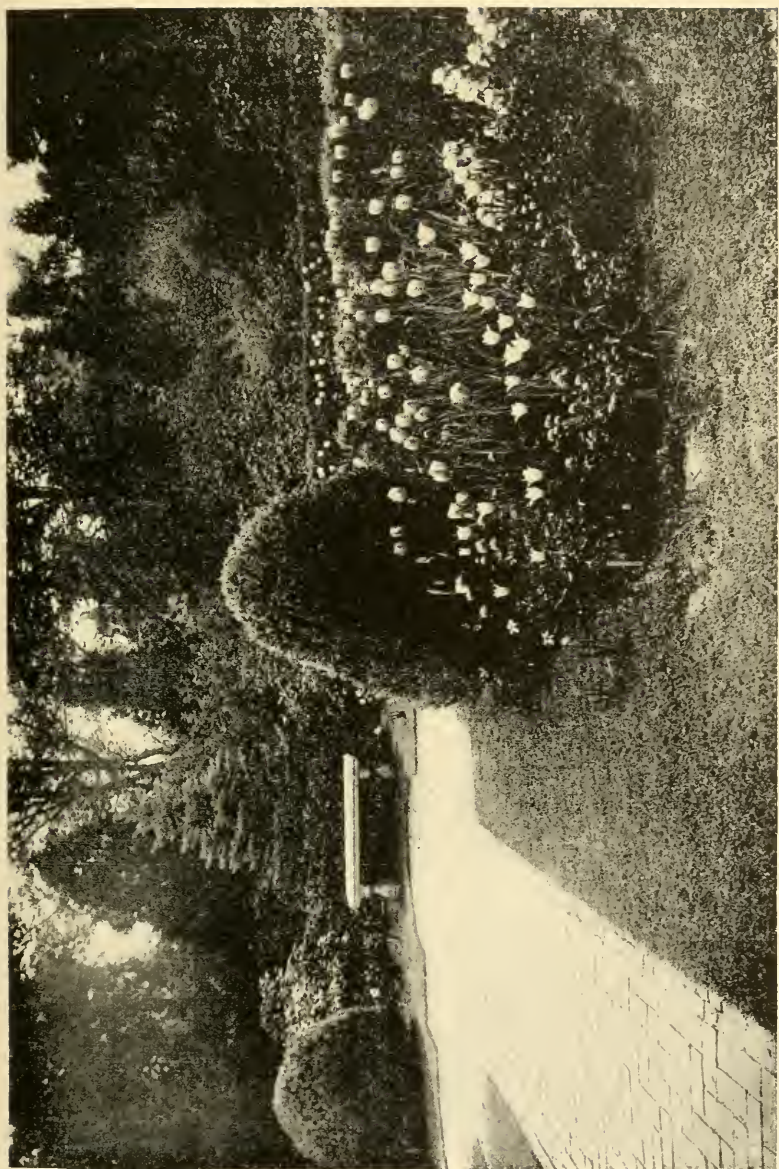
A bold and magnificent display may be had by planting big blocks of such varieties as: City of Haarlem, Orion, Farncombe Sanders, and Prince of the Netherlands, alternately with equal sized masses of very dark purples such as Velvet King, Frans Hals, Giant, Jubilee, etc., especially if so placed, that one comes upon the arrangement all at once, from around a tall thick evergreen or hedge.

Large blocks were planted that way in the beautiful estate of Samuel Untermeyer, Esq., "Greystone," Yonkers, N. Y., as illustrated in these pages; here were used such varieties as Madame Krelage, Baronne de la Tonnaye, White Queen, Pride of Haarlem, etc. You will see the fine effect to be obtained by the careful planting of judiciously selected colors; this plantation has been considered the finest that was ever displayed in this country; it will be however eclipsed by an enormous and most valuable plantation that I have just finished making in the magnificent new Grecian Gardens forming part of this gentleman's enlarged estate. Here I have not only planted these tulips in large masses, but also in colonies; in small groupings; here and there to "liven up" a group of "forbidding looking" evergreens or to allow some of the most beautiful varieties to nod their lovely heads over quiet pools.

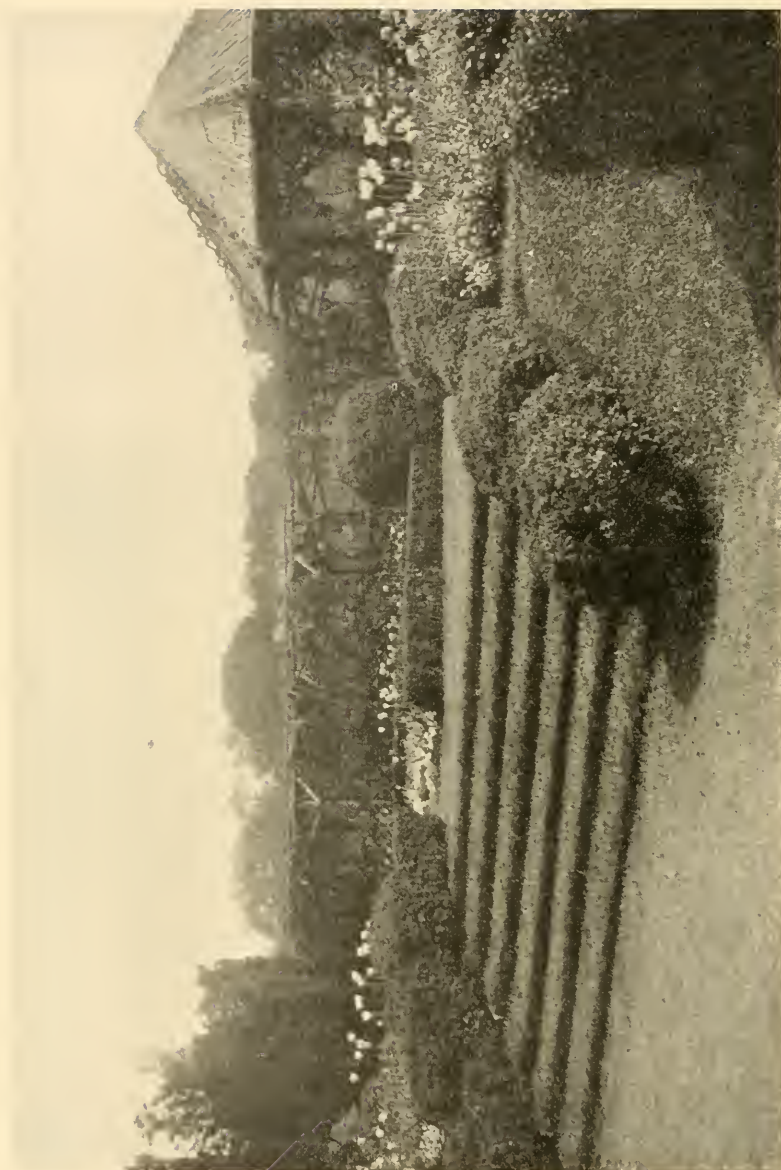
From the humble but softly beautiful "Clara Butt" to the majestic and gigantic "Louis XIV," draped in gorgeous Eastern raiment, and the queenly "Mrs. Katherine Havemeyer" which is one of the rarest and most wonderfully colored repre-



ROSES AND TULIPS IN THE SAME BEDS,
TESTING GARDEN OF T. A. HAVEMEYER, ESQ.
BROOKVILLE, L. I.



COTTAGE AND DARWIN TULIPS, WITH NARCISSUS POETAZ,
THE BACKGROUND OF EVERGREENS
G. D. PRATT, ESQ., GLEN COVE



EFFECTIVE SETTING FOR MAY-FLOWERING TULIPS
GEORGE D. PRATT, ESQ.
GLEN COVE



DARWIN TULIPS WITH MIYOSOTIS AND BOXWOOD
GEORGE D. PRATT, ESQ.
GLEN COVE

sentatives of this race of giant tulips, all will be represented in this unusual plantation.

Here we have departed from the custom of planting taller varieties in the middle of the beds and banding around the edge with a dwarfer sort, when "mass planting;" this, of course may be most successfully done as will be seen in the illustrations, where the fine plantings of tulips near the residence of W. B. Thompson, Esq., of Yonkers, N. Y., are depicted.

This made a magnificent showing indeed, the following varieties having been used very effectively. Erguste, La Tristesse, Miss Willmott, Mrs. Moon, Pride of Haarlem, Bronze Queen, Baronne de la Tonnaye, Bartigon, William Copeland, Euterpe, La Tulipe Noire, Professor Rauwenhoff, and Sieraad van Flora.

A similar planting was made in the grounds of the International Garden Club at Bartow, New York City. The varieties Mrs. Moon, Baronne de la Tonnaye, Clara Butt, May Queen, Loveliness, La Tulipe Noire, Painted Lady, Reverend Ewbank, Margaret, Professor Rauwenhoff, Feu Brilliant, Pride of Haarlem, La Candeur, and Euterpe, etc., having been used with good effect in the succession named as will be seen from the illustrations. Here this plantation lacked a necessary background of shrubbery, evergreens or some other planting between the wall and the tulips, the planting having been made when the Garden Club was only recently organized, and the background lacking. This will, however, be taken care of during the coming season after which such displays of these fine tulips will show up much better. That fine flowers of these tulips were produced is easily seen in the reproduction of a "close up" shown in these pages, where it can be distinctly seen that some of the bulbs produced four flowers each, a large percentage produced three flowers to each bulb and a great quantity everywhere showed two perfect flowers to each bulb. While of course the highest perfection in bulbs was supplied to these places, such a result was nevertheless most remarkable.

Now getting back to my remark in connection with these plantings in solid beds or groups and the custom of planting the taller variety in the middle of the bed and the dwarfer sort

banded around, which mode of planting has made and will make such fine displays and will give abundant opportunity for color arrangements, I would prefer to do away with this method of planting in gardens where less formality is required. I would "scatter" the dwarfer sorts through the taller forms, watching of course my colors carefully; for instance *Inglescombe Yellow* I would scatter through *La Tristesse*; *Primrose Beauty* through *Clara Butt*; *Moonlight* through *Clara Butt*; *Edmée* with a few *Suzon* and sparing use of a dark purple like f.i. *Philippe de Commynes*; or *Spinoza* with a few *Velvet King*.

A most unusual and very effective display was seen last May on the estate of Wm. B. Thompson, Esq., in Yonkers, N. Y.; from a distance the dazzling picture produced itself before me of a large group of *Azalea Hinodigiri* amongst which Darwin Tulips *Ergusta* had been artistically planted, with a background of evergreens and as foreground a long deep green lawn; this indeed made an unforgettable picture.

I would now suggest that some "groundwork" or "underplanting" be used wherever May-flowering tulips are massed, the effect of which is so well illustrated in the accompanying reproductions of "Killenworth" the wonderful estate of Mrs. Geo. D. Pratt, at Glen Cove, Long Island; these photographs speak for themselves; they demonstrate the love of the owner for her garden and the able working out of her ideas.

Here it has been proved so well that unlimited variety of plantations and effects can be made with the May-flowering Tulips; for "groundwork" *Myosotis* Royal Blue, Daisies, Pansies, Iceland Poppies and *Arabis albida* have been used.

The special value of *Arabis* is, that it is not stiff; it is feathery and also goes well with underplanting of *Myosotis*.

Myosotis with Tulips *Inglescombe yellow* or *Primrose Beauty*, makes a pretty combination; together with *Clara Butt*. Tulip *Moonlight* is best of all with such a color as *Clara Butt*; with a "groundwork" of *Myosotis*.

I should like to advise the following procedure when planting tulips with "underplanting."

Lay the bulbs on the ground first, just as you wish them to

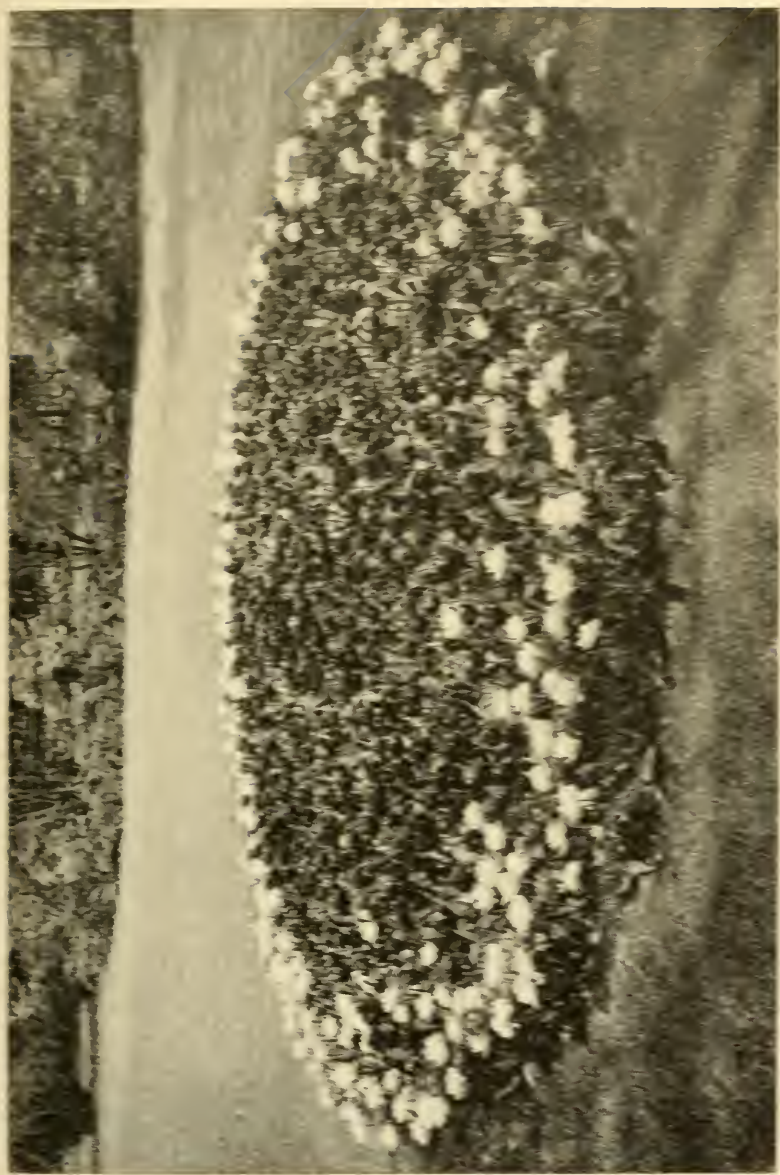
flower in mixture or otherwise. Then plant 5 inches deep, a little sand underneath each bulb for drainage, and about 5 to 6 inches apart. You will get better results with a little wider planting. When all the bulbs are in the ground, go over with your "groundcover plants" and plant just where you care to lay them down. If a plant gets where a bulb comes, you can shift either one or the other a little to the side; should the "groundcover" land on top of a bulb and you don't know it, the bulb will come up sideways just the same.

Do not "underplant" too thickly; that mistake is so easily made; it often looks as if these groundcover plants have not been planted very thickly, but remember that these plants will grow larger.

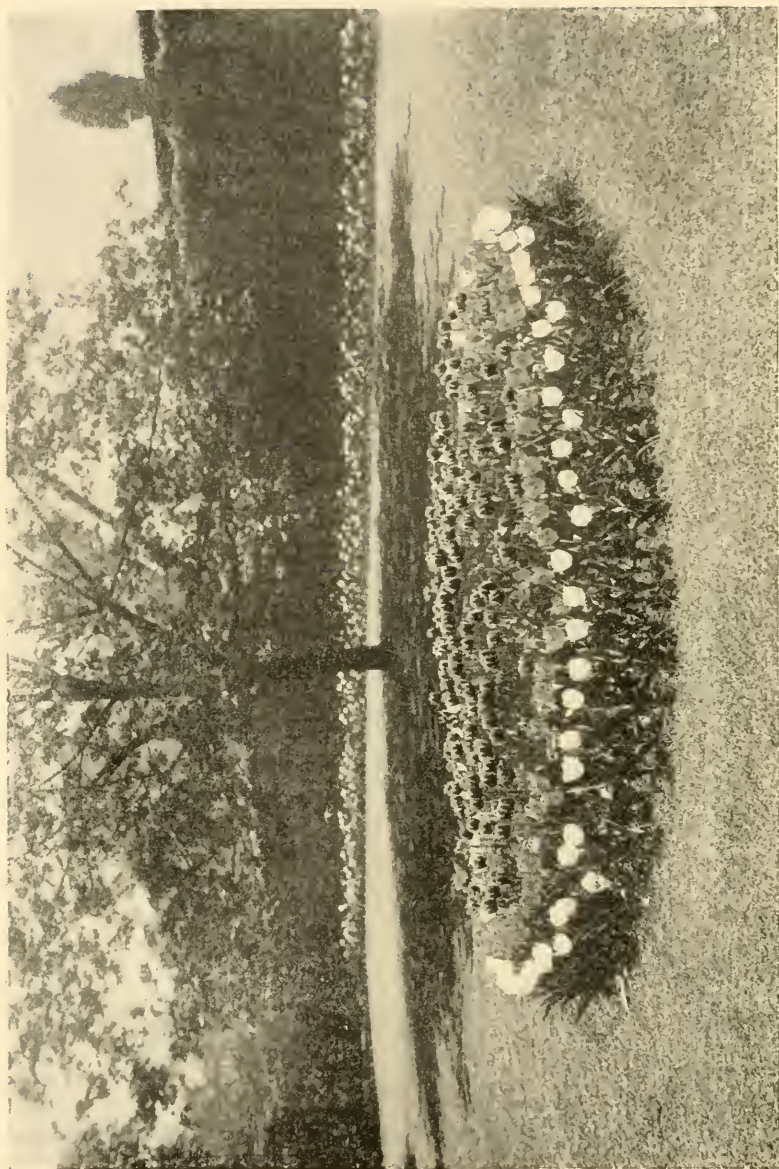
Some of the illustrations in these pages show parts of the interesting estate of T. A. Havemeyer, Esq., Brookville, Long Island; this is without doubt the most interesting estate especially to horticulturists and flower-lovers, in this country. Here nature and man have joined hands in the accomplishment of horticultural feats; in the arranging of the loveliest scenes be it in the woods, around quiet pools, near rockeries or along natural walks. Here it is shown how abundantly nature will reward if you will only take the trouble of giving her a chance.

May-flowering tulips, as well as many other bulbous plants, occupy a prominent place and a considerable part of Mr. Havemeyer's estate has been set aside by him and has been dedicated to the growing, cross breeding and displaying of the finest varieties of this Eastern flower. Here we have tested, compared, and grown over six hundred varieties of tulips, in various positions, soils, and combinations. The reproductions show a most successful plantation of masses of Darwin and Breeder tulips in a formal rose garden amongst the roses. This experiment was attempted as quite a departure in tulip planting last spring; the tulips seemed to get along very well indeed with the rose plants; the display was magnificent; the flowers large and of good color, perfect in every way, while the roses did not seem any the worse for having had these companions.

I therefore believe that those whose garden space is limited



GOULD EARLY THISTLE, NUR VAI THER HOLE (YELLOW) AND
 VOUGBAAL (SCARLET)
 MICH. H. DALLING, JOEL, MANABOJIC



SINGLE EARLY TULIPS WHITE BEAUTY, WITH RISING SUN
AND GRAND DUC IN CENTER
MRS. H. DARLINGTON, NIAMARONECK

may successfully try this novel way of planting May-flowering tulips.

Other experiments in these gardens have shown us how well Narciss Poetaz Elvira may be planted effectively with these tulips; they will flower at the same time. I have had a very fine border of Darwin Tulips Carl Becker with ground work of *Arabis*; edged with White Pansies and Cottage Tulips The Fawn with Narciss Poetaz Elvira scattered throughout. Can you picture to yourself anything more beautiful; I believe it is impossible to bring before you a picture of this combination as beautiful as it really is. I would have every reader try this; how many more flower-lovers this would create.

Another very effective bed consisted of Darwin Tulips Ariadne with groundwork of *Arabis* and Narciss Poetaz Elvira scattered "thinly" throughout. Darwin Tulips Nauticus may be used likewise; also Darwins Farncombe Sanders, though this variety "burns" more than Ariadne. Experiments in Mr. Havemeyer's gardens have also demonstrated the fact, that May-flowering Tulips may be successfully planted as late as February and probably still later.

One of the reproductions shows a planting of Darwin Tulips Euterpe made in February, 1917, amongst some *Iris germanica*, and *I. pallida dalmatica* in a border in the New York Botanical Garden. The flowers being produced somewhat later due to the very late planting were in full bloom simultaneously with the *Iris* and they were perfect. The effect was very fine indeed.

I induced the late Mr. R. M. Ward a few years ago, to plant a collection of Darwin Tulips late in February. This collection provided a fine border in full bloom in June, when everybody else's tulips were long past.

Another collection of May-flowering Tulips was planted on the last day of February, 1917 in the grounds of the International Garden Club, Bartow, New York City. The ground was frozen solid and as hard as mortar. The bulbs were "inserted" or "pried in" with a pickaxe; nevertheless every bulb produced a strong flower on a sturdy stem though the heights of the stems were slightly (only slightly) below normal.

These experiments prove my contention, that May-flowering Tulips may be successfully planted at most any time from November till March which is another great advantage over other forms of tulips. And those who would like to have their gardens ablaze with color early in June, especially in the Northern climates, where the country estates are generally occupied very late, can safely plant these tulips for that purpose.

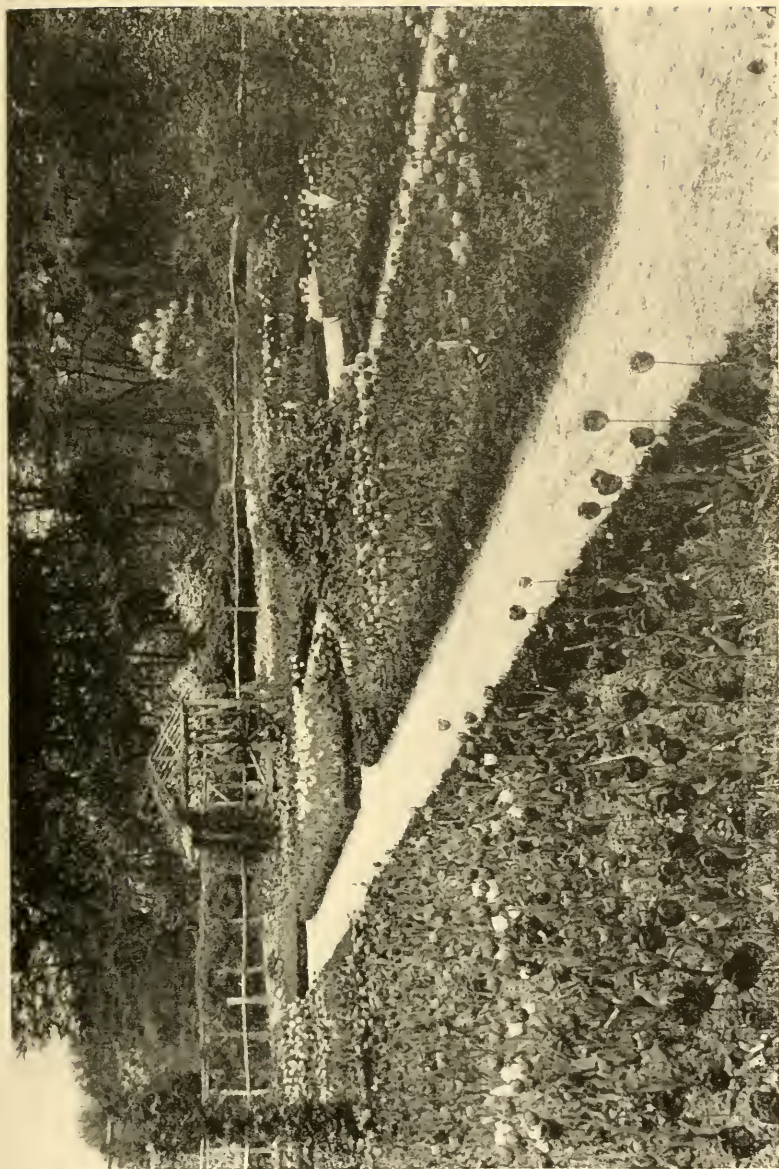
I hold that these May-flowering Tulips are undoubtedly the best tulips for the garden, especially for those who do not occupy their estates until May or later. For earlier flowers of course the Class of Early Tulips also makes very effective plantings as may be seen from the reproductions showing part of the gardens of Mrs. H. Darlington at Mamaroneck, N. Y.; one very fine display consisted of the varieties Grand Duc (center), Rising Sun (middle band), and White Beauty (outer border).



DARWIN TULIP ERGUSTE WITH AZALEA HINODIGIRI
WALTER B. THOMPSON, ESQ.
YONKERS



MISS WILLMOTT (YELLOW) AND LA TRISTESSE (SLATY BLUE)
W. B. THOMPSON, ESQ.
YONKERS



TULIPS IN THE ROSE GARDEN OF
T. A. HAVEMEYER, ESQ.
BROOKVILLE, L. I.

*Recent Investigations on the Production of Plant Food in the Soil**

By E. J. Russell, D.Sc.



FROM time immemorial the soil has been recognized as the source from which plants draw their sustenance, and therefore on which we ourselves, in common with the animals, depend for our food.

"It is the Earth," wrote Pliny† some 2000 years ago, "that, like a kind mother, receives us at our birth and sustains us when born. It is this alone, of all the elements around us, that is never found an enemy to man. The body of waters deluges him with rains, oppresses him with hail, and drowns him with inundations; the air rushes in storms, prepares the tempest, or lights up the volcano; but the Earth, gentle and indulgent, ever subservient to the wants of man, spreads his walks with flowers and his table with plenty; returns with interest every good committed to her care; and though she produces the poison she still supplies the antidote; though constantly teased more to furnish the luxuries of man than his necessities, yet even at the last she continues her kind indulgence and when life is over she piously hides his remains in her bosom."

Most of the philosophers of ancient times, and up to the end of the eighteenth century, have something interesting to say about the soil, and in 1675 the famous John Evelyn delivered his "Philosophical Discourse of Earth" to the Royal Society wherein he summarizes the current ideas of his time. This discourse might have been the starting-point of a separate soil

* Reprinted from *Journal Royal Horticultural Society*, December, 1915.

† Pliny, *Nat. Hist.* lib. 2.

science. But unfortunately it was not sufficiently experimental to stimulate other investigators, and at the end of the eighteenth century, when the foundations of most of the modern sciences were being laid, there was no one of outstanding genius who took any special interest in the soil. In consequence it has never fallen into any of the conventional divisions of science, but lies in the borderland where the chemist and botanist meet the farmer and the gardener.

It is now recognized that the plant takes up something of everything which is dissolved in soil water, quite regardless of whether the effect is going to be good, bad, or indifferent. Even the most unlikely elements—gold itself and still rarer elements—have been detected in plants and have come in from the soil.

By long custom gardeners and farmers give the name plant food to those substances in the soil which help the plant to grow. I am retaining the expression in this sense, though it could be severely criticized from the physiological standpoint. Strictly speaking, the substances about which I am going to speak are not plant foods at all, but only the raw material out of which the plant builds up its food process infinitely wonderful and complex. But we shall avoid all ambiguity by giving our definition at the outset, and we can further disarm the criticism of the physiologist by inviting him to give us a better term that is equally simple.

We all admit the principle that we must be prepared to alter our vocabulary whenever the old terms would cause us to lose touch with the pure chemists and plant physiologists. But the changes in vocabulary of any one branch of science are now so rapid that one shudders to think what would happen to a borderland subject that tried to keep pace with two or three sciences. We may therefore be allowed to keep to our old words provided they convey a definite meaning to us, and that we make this meaning perfectly clear.

By plant food from the soil we shall understand those substances which the plant takes from the soil and which it utilizes in building up its tissues.

The plant food obtained from the soil is, roughly speaking, of two kinds:

(1) Substances already formed in the soil, which were part and parcel of the minerals from which it was derived.

(2) Substances not originally present, but which have come in since the soil was laid down as the result of the changes produced by vegetation.

Both of these are equally important, and both have given rise to a vast amount of research work. But each requires a different type of investigation, and so it has happened that each has been studied in different laboratories and under somewhat different conditions. The substances derived from the rock minerals, often called the mineral plant foods, including phosphates, salts of potassium, calcium, etc., have been studied in the main from geological and physico-chemical standpoints, while those resulting from vegetation have been worked at almost entirely from the biochemical standpoint. But the division line is only in the laboratory and does not exist in Nature; we shall see that all of the plant nutrients fall into each group.

The beginning of the soil goes back to remote ages when the particles of sand, grit, or clay got split off from the original rocks and began their wanderings by stream, wind, or glacier that have finally brought them to their present place. Many of their properties were determined during these wanderings and cannot now be altered; thus some of the most striking differences between the red soils of South Devon and the grey soils of Dorset arose out of the differences in conditions between Triassic and Lias times; these differences have persisted all through the ages, and we cannot now go back and undo the work of the past.

But the mineral particles do not constitute soil. The final stage in soil formation is not complete until vegetation has sprung up and dies, and its remains have mingled with the mineral fragments and begun to decay. During its lifetime vegetation takes certain substances from the mineral matter and the atmosphere and builds them up into complex organic

matter. Like other constructive work, this process requires energy, which in this case is derived from the sunlight and is stored up in the complex substances of the cell tissues.

When the plant dies and its remains mingle with the mineral fragments it begins to decay. The whole process then reverses: instead of a building up there is a breaking down; the fabric of complex material slowly elaborated during life is disintegrated and resolved into the simple substances out of which it was formed, and all the stored-up energy is dissipated. The old life is cleared away and the ground is left clear for new life; the old plant tissues are converted into food for another generation of plants. So prodigal is Nature with life that even this process of dissolution and decay affords the means whereby more life may manifest itself. A whole population of the most varied description springs up in the soil, feeding on these plant tissues, deriving its energy from the energy stored up during the lifetime of the plant, and reversing completely the changes effected by the plant.

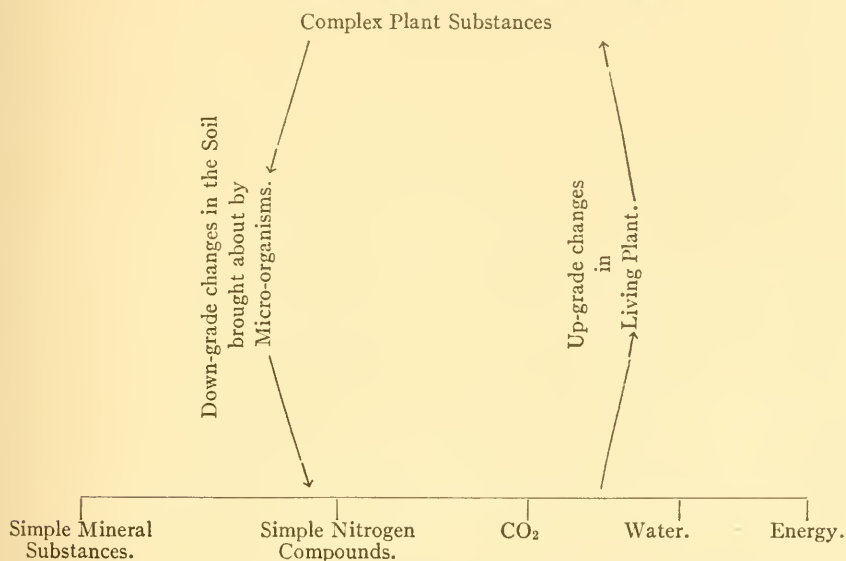
Scheme Showing how Soil is Formed

Mineral fragments	+	Plant Residues	=	Soil
[No energy.]		[Organic matter comprising		[Comprising
		Carbohydrates (soft cellulose, gums, &c.)		Mineral fragments
		Cellulose (resistant fibers, &c.)		Organic matter
		Proteins		Sources of energy
		Mineral substances		Micro-organisms.]
		Waxes.]		

So the cycle is completed. Starting with certain simple materials, the plant protoplasm builds up complex plant substances, fixing the sun's energy by means of the transformer chlorophyll; this is the constructive part of the cycle. Later on, the other part—the destructive change—begins; the complex substances break down and are resolved finally into the simple substances with which the change began. Things are now as they were, excepting only that these simple substances have for a time been caught up in the wheel and have served for the manifestation of life; they have then been put down again, ready to serve as nutrients for a new generation of plants.

The soil is the medium in which this second part of the great cycle of life goes on. It is so intimately bound up with this cycle that one cannot separate them, or think of the soil apart from the changes occurring within it. This is the great distinguishing feature of the soil, marking it off sharply from a heap of mineral matter and bringing it out of the province of the mineralogist into the sphere of the biochemist. In the language of the laboratory, the soil has to be studied as a dynamic and not as a static medium, and we have to think of it as the seat of perpetual change.

Cycle of Changes Between the Soil and the Plant



The processes involved in the formation of soil may be seen at work on the little landslips that occur periodically on clay cliffs. With each new slip a new surface of subsoil is exposed as a heap of virgin mineral matter. Before long vegetation begins to spring up: frequently colt's-foot and *Equisetum*. This dies down and starts the process of soil formation; finally a very different type of vegetation becomes possible. In order to follow the process more closely we have made at Rothamsted permanent beds of some of our clay sub-soil, and have com-

menced systematic botanical, bacteriological, and chemical observations of the changes taking place.

The reverse process can also be seen at Rothamsted. A soil has been persistently cultivated for seventy-one years and all of the crop removed except the roots and the stubble; the organic matter and the energy supplies are therefore running out, and we are gradually approximating to the original condition. It is interesting that here also colt's-foot and *Equisetum* flourish, although we hardly find them on our other plots.

The system we have to study is this mass of mineral particles intermingled with plant residues and living organisms; and our object is to trace the stages by which the decomposition proceeds and the energy runs down.

The first obvious change is that the plant material loses its green colour and goes black; this can easily be observed when leaves are dug into the soil or dragged in by earthworms. The old chemists were much interested in this black substance, and in the early days of the last century, when men of science were very prodigal with new names for new forces and new substances, they supposed it to be made up of a number of compounds which they called ulmic acid, crenic acid, apocrenic acid, humic acid, etc. No one has ever succeeded in preparing any of these compounds in any state that would satisfy a modern chemist, and there is no evidence whatsoever that they exist; but their names have been piously handed down through long generation of students, and they still occasionally turn up in popular articles and in answer to examination papers.

So far this black material has defied analysis. Modern organic chemistry has been developed largely to deal with liquids and crystals; this black substance is neither, but is an amorphous glue-like body of the class known as colloids. Physical chemists in several countries are (or were) working at colloids, and we may yet hope to see some method of resolving them. The way out of such a predicament is to give the substance a non-committal name, and so we retain the old designation "humus."

Part of the humus is soluble in alkalis, and this was supposed

naturally enough to be necessarily of more value in plant nutrition than the insoluble part; analytical methods were therefore devised for estimating its amount. It does not appear, however, that anyone has ever tried the fundamental experiment of testing whether the soluble part is really superior to the rest. *A priori* assumptions in our subject are particularly treacherous, and at Rothamsted the question has recently been under investigation. So far as present experiments have gone, the removal of this soluble humus has failed to make any appreciable difference to the growth of the plant, or to the physical and chemical properties of the soil. Further experiments with various types of soil would be necessary before pronouncing too definitely but at present there is nothing to indicate that the soluble humus plays the controlling part in soil fertility formerly attributed to it.

A more fruitful method has been to study the fate of the separate plant constituents and ascertain the changes through which they pass when decomposed in the soil. For this purpose the plant substances may be conveniently divided into several groups; the carbohydrate group, including soft celluloses, gums, etc.; the hard resistant fibres made up of resistant cellulose the proteins; the mineral substances; and the waxes. Of these we may at once dismiss the waxes, as they appear to decompose only slowly in the soil. Nor can we say much about the changes in the mineral matter, as these are not sufficiently investigated.

Very little is known about the decomposition of the carbohydrate constituents except that it is rapid. Apparently a considerable number of organisms is able to bring it about, including bacteria, moulds, and larger forms ranging up to earthworms. So far as is known the process seems to be analogous to the retting of flax and the formation of skeleton leaves. It is no doubt this material that furnishes most of the energy for the soil population, and we shall see shortly it is indispensable for some of the soil changes that can go on only as long as energy is put into them.

Its decomposition has another important effect. It forms the bulk of the cell walls, and as soon as it is gone the plant

residues lose their structure and definitely begin to mingle with the soil, becoming subjected to the various decomposition agencies at work therein.

The harder resistant cellulose, making up the leaf skeletons, the fibres, etc., takes longer to decompose in the soil and is not attacked by nearly so many organisms. No single organism is known with certainty to decompose it under the aerobic conditions obtaining in the soil, though an association of organisms breaks it down fairly readily. In absence of air it decomposes with formation of two inflammable gases, marsh gas and hydrogen. This decomposition goes on at the bottom of stagnant ponds and in marshes, and the bubbles of inflammable gas can be got by stirring up the mud with a stick. There is, however, no evidence that these gases are formed in the soil, and so far as can be judged the change proceeds in quite a different way.

The decomposition of protein in the soil is of altogether different significance, because in this case it is the products that are of chief importance. It is difficult to study this change in the soil because of its complexity, and no progress was possible with the early stages until prolonged laboratory experiments had shown the general nature of the decomposition. Even now we do not know *for certain* that the stages are the same in the soil as in the laboratory, but they seem to be, since typical laboratory products have been found by Schreiner and his co-workers in the soil, including amino-acids, diamino-acids, purin bases, etc.

Scheme Showing Similarity Between Process of Decomposition of Protein in Soil and that of Hydrolysis in the Laboratory

In Laboratory	Amino-acids (various)	Diamino-acids (Histidine. Arginine)	Purin bases (various)	Humus
Found in Soil	Amino-acids not identified	Diamino-acids (Histidine Arginine, &c.	Purin bases	Humus

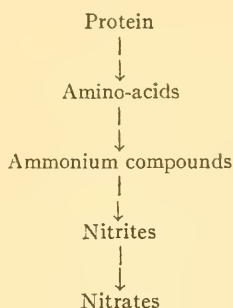
In the soil, however, the decomposition proceeds further, and the various intermediate products break down to yield ammonia.

So far as is known, this change is mainly brought about by bacteria and possibly other organisms; recent investigations at New Jersey suggest that moulds also may be effective. It is certain that considerable numbers of different organisms are able to bring about the change. There are also indications that some of the remarkable chemical ferments known as enzymes are active.

Ammonia is the last stage in the decomposition of the proteins. If it were left to itself it would change into the carbonate, a substance which in small quantities can be taken up and utilized by the plant, but which is harmful in larger quantities, besides having rather a bad effect on heavy soils, making them very sticky.

But the ammonia is not left to itself. It is at once seized upon by another set of bacteria, quite distinct from all others, which oxidize it to nitrite; and this in turn is seized upon by an organism, also quite distinct from any other, and oxidized to nitrate.

Stages in the Decomposition of Protein



The decomposition of the protein thus involves two completely distinct processes: the production of ammonia, which takes in at least two stages, and the production of nitrate, which also involves at least two stages. It so happens that in natural conditions the last stages proceed more rapidly than the earlier ones, so that each set of organisms may be regarded as having to wait for those engaged in the earlier stages. This arrangement seems at first sight wasteful, but it is really advantageous,

because it prevents any accumulation of intermediate products which, as we shall see later on, might be harmful both to bacteria and to plants.

The story of the nitrifying organisms is an old one, but it bears retelling. Only two organisms are known that can change ammonia to nitrite, and only one that can change nitrite to nitrate. All three are extremely small, and they are unique in that they build up their substance out of carbon dioxide, obtaining the requisite energy from the oxidations of the ammonia, and not from sunlight, as plants do. They do not require organic matter either for food or for energy supply—again a distinction from other micro-organisms; indeed many organic compounds are harmful to them. This property is so marked in culture solutions that all organic matter was long supposed to be harmful, but this is now known to be incorrect. Nitrification will take place in presence of organic matter; it is known to go on during sewage purification, and it takes place regularly on the outside of a dungheap. But there are two conditions which are highly detrimental to the nitrifying organisms, viz., acidity and lack of air. Provided these are avoided, the organisms will tolerate soil organic matter.

Running alongside of this decomposition is another. The amount of nitrate formed is never as great as one expects from the nitrogen in the protein, and the deficit is attributed to a loss of gaseous nitrogen. We have, therefore, two possibilities, the protein may change to nitrate or it may change to nitrogen.

Now the evolution of gaseous nitrogen is of no value whatsoever to the farmer or the gardener; on the contrary, it represents a dead loss, because the nitrogen is only dissipated. It is difficult to exaggerate the seriousness of his loss to the intense cultivator. One of our plots annually receives the liberal but by no means excessive dressing of fourteen tons of dung to the acre, containing 200 lb. of nitrogen. Of this about 50 lb. is recovered in the crop, and about 25 lb. remains in the soil; some also gets away in the drainage water. But about one half of the nitrogen cannot be accounted for, and presumably it goes off as gas at any rate the cultivator gets no benefit from it.

It is impossible to form a precise estimate of the losses of nitrogen in a market garden, but the conditions all favour high losses; still more do they do so in glasshouses where crops like cucumbers are being grown.

The market gardener is compelled to manure heavily in order to secure heavy crops, and his loss of nitrogen simply represents the extra price that always has to be paid whenever production is forced beyond a certain level. But just as the engineer has learnt how to increase the efficiency of an engine, so the cultivator has to learn how to increase the efficiency of his production processes. This cannot be accomplished until the nature of the soil-changes is better understood and the *cause* of the loss of nitrogen has been revealed. The action in the soil is too slow to allow of easy investigation; it is marked enough to cause serious loss over an acre in a year, but not in the small amount of material one uses in the laboratory and the limited time available for an investigation.

Table Showing Losses of Nitrogen from Cultivated Soils, Broadbank Wheat Field, 47 Years, 1865-1912

	RICH SOIL (2) POUND TO THE ACRE	POOR SOIL (3) POUND TO THE ACRE
N. in Soil, 1865.....	.175% = 4340	.105% = 2720
N. added in manure rain (5 lb.) seed (2 lb.)...	9730	330
	<hr/>	<hr/>
N. expected in 1912	14070	3050
N. found in 1912245% = 5730	.103% = 2510
	<hr/>	<hr/>
Loss from soil.....	8340	540
N. in crops	2550	750
	<hr/>	<hr/>
Balance being dead loss.....	5790	- 210
Annual dead loss.....	123	- 5

When a difficulty of this sort arises the method adopted is to study parallel cases where the action is more pronounced. Two of these are being studied in some detail; the loss from a sewage bed and the loss from a manure-heap. Sewage presents a particularly interesting case, because here the loss is actually

utilized as a means of sewage disposal, and the sewage chemist tries to encourage it just as strenuously as the agricultural chemist is trying to stop it. Indeed the situation is not altogether devoid of humour, for the community on the one hand spends many thousand pounds in destroying nitrogen compounds in its sewage works, and on the other spends many thousands of pounds in purchasing nitrogen compounds for its soils. It was to find some way of bridging this difficulty that the Hon. Rupert Guinness came forward and enabled us to secure at Rothamsted the services of Mr. E. H. Richards, late of the Sewage Commission investigations, to make a systematic study of these losses. At Rothamsted we have selected the manure-heap because of its special agricultural and horticultural importance in France, Muntz and Lainé took the sewagebed. For a long time it was uncertain whether the gaseous nitrogen arose direct from the proteins by a process analogous to combustion or whether it was formed by decomposition of the nitrates. The problem is not yet solved, but the evidence is steadily accumulating against the combustion hypothesis, and so far as it goes it indicates that the nitrogen passes safely through the ammonia stage but gets lost afterwards. If this turns out to be correct, an interesting method of reducing the loss, if not of preventing it altogether, will become possible. It is obvious that if the ammonia (or the nitrate into which it is converted) is absorbed by the plant it cannot give rise to gaseous nitrogen in the soil, and therefore the loss will be eliminated by arranging the conditions so as to facilitate absorption by the plant. It has been shown in agricultural practice that absorption of nitrate is greatly facilitated by properly balancing the manures, and we may hope for a good deal by adopting the same plan in horticulture. At present horticultural practice is, to say the least, indiscriminate, and there is considerable scope for improvement.

Again, however, a cycle is operating: opposed to all this loss of nitrogen are two sets of processes by which the losses are made good and nitrogen is fixed in the soil.

The growth of leguminous crops, as is well known, adds to the

stores of nitrogen in the soil through the combined operations of the plant and the organisms present in the root nodules. Leguminous plants occur in nearly all natural vegetation and their activity is very wide-spread, constituting by far the most considerable source of added nitrogen.

The second source of increased nitrogen is to be found in the activities of certain free-living bacteria which can fix nitrogen on their own account and do not require the co-operation of a living plant. At least two of some importance are known: *Clostridium*, which was the first to be discovered, is an anaerobic organism, *i.e.* it works in absence of air, but it can form a close association with aerobic organisms so that it can work in presence of air, and certainly its action is not precluded in the soil. The second, *Azotobacter*, is more potent and has proved far more attractive to investigators. It works very vigorously in crude cultures, but is less active in pure cultures; it used to be supposed to lose its potency on cultivation, but recent work has shown that it remains active in a suitable medium.

Both *Clostridium* and *Azotobacter* build up complex nitrogen compounds from gaseous nitrogen, a process that requires energy; and both draw the necessary energy from the oxidation of the plant residues—presumably the carbohydrates—in the soil. It is reasonable to suppose that both organisms are active in the soil, but no rigid proof has ever been given. The fact that land laid down to grass tends to gain nitrogen has been adduced in proof, but it is not really satisfactory.

Table Showing Gain in Nitrogen in Land Laid Down to Grass in 1856 and Mown Annually.
Rothamsted

	1856	1879	1888	1912
Per cent of Nitrogen in top 9 inches.....	.152	.205	.235	.338

On such land the ammonia and nitrates are assimilated more rapidly and completely than in arable land, and there is therefore less liability to loss of nitrogen; further, leguminous herbage almost invariably grows for part if not for the whole of the year, making additions to the nitrogen supply. There is noth-

ing to preclude the action of the free-living nitrogen fixers, but nothing to prove it.

These accumulated nitrogen compounds, whether built up by organisms associated with the Leguminoase or by the free-living forms, all break down by the processes just indicated and pass into nitrates with or without loss of gaseous nitrogen, according to the conditions.

From the standpoint of plant nutrition we may look upon the formation of nitrates in the soil as being the most important of all the processes, and for long it was regarded as probably the only one with which the agricultural chemist need concern himself.

But recently another possibility has been opened up. Not long ago the animal physiologists found that a mixture of fats, carbohydrates, proteins, and certain mineral substances, which ever since the beginnings of animal physiology had been looked upon as a satisfactory diet for any animal whatsoever, is really not sufficient. Hopkins found that animals could not build up their tissues when fed with certain pure proteins, notwithstanding the ample nitrogen supply. Certain molecular groupings are needed, and in practice these can only be obtained in a mixed diet.

Now it is very attractive to apply this to plants. We all know how the gardener hankers after a mixed diet for his plants, and moreover we all know that the opinions of a good practical man are entitled to respectful consideration. It would be a simple matter to draw a parallel between the plant and the animal, and to suppose that the plant requires the mixture in order to ensure the supply of all necessary molecular groups.

There is, however, no experimental basis for such a view. Plants have considerably greater power than animals of building up the necessary proteins, and they can be, and at Rothamsted they regularly are, grown to perfection in water cultures containing no other nitrogen compound but sodium nitrate. We can find no evidence whatsoever that it is *necessary* to add any other nitrogen compound. But although not necessary it might be advantageous to the plant to receive some of its

groups ready made. Schreiner and Skinner* have drawn up a list of complex nitrogen compounds, which in their experiments increased the amount of growth even in presence of nitrate. This possibility is very interesting and requires considerably more investigation.

A much more subtle possibility has recently been discussed. Animal physiologists have found that even a proper mixture of proteins, along with purified fats, carbohydrates, and mineral substances, does not constitute a perfect diet; the animal makes no growth, but may even develop diseases like beri-beri, unless a little milk or vegetable juice is added. Until the nature of these compounds is known they are designated by the non-committal title "accessory substances." Again the interesting question arises: Do plants afford a parallel case? Armstrong has already put forward the suggestive hypothesis that certain substances which he called "hormones" are advantageous to the plant in altering the permeability of the protoplasm and thus regulating certain vital processes, such as the intake of nutrient salts. Some interesting facts are on record. We have found at Rothamsted, for example, that cucumbers make better growth in water cultures containing soil extracts than in cultures without soil extract even when supplied with a complete nutrient solution. The experiment is not easy to interpret because of the difficulty of analysing the extract. But it would be attractive to think that some of the vague physiological conditions that trouble the grower are to the plant what beri-beri and similar diseases are to the animal—the result of withholding some essential or useful "accessory substance." Bottomley considers that certain substances obtained in the bacterial decomposition of peat are of this nature. Still more recently Maze has published some remarkable results showing that maize fails to grow in water cultures containing all the recognized nutrient salts if these are chemically pure, but it grows normally as soon as tap water is introduced. No combination of added salts has as good an effect as the tap water.

* U. S. Dep. of Agr., Bureau of Soils, Bull. No. 87, 1912.

Growth of Maize in Water Cultures

(MAZÉ, 1915)

Culture solution (pure) + Compounds of boron and arsenic.....	10
Culture solution (pure) + Compounds of boron and aluminium.....	24
Culture solution (pure) + Compounds of boron, aluminium, and arsenic	16.5
Culture solution (pure) + Compounds of boron, aluminium, arsenic, and iodine.....	36.6
Culture solution (tap water).....	43

A considerable amount of work has obviously to be done before the problem can even be clearly stated.

But there seems to be no getting away from the fact that the nutrition of the plant in the soil is mainly bound up with the decomposition of the plant residues. In their original state these residues are valueless and may even be indirectly harmful to the plant; after decomposition they begin to be valuable. The speed and completeness of the decomposition are therefore of fundamental importance in soil fertility.

The agents bringing about the decomposition are numerous. Large organisms, earth-worms, etc., play an important part in the dissemination of the material, but otherwise do not seem to be essential; there is a sufficient variety of micro-organisms to complete the change without them.

The speed at which the change takes place obviously depends on the activity of the organisms and on the composition of the material. When for any reason it is slow there is a considerable accumulation of undecomposed substance which has characteristic and unusually harmful effects on the soil. Certain of the grass-plots at Rothamsted have received large annual dressings of sulphate of ammonia for so many years that the soil has become distinctly acid. The speed of the decomposition processes has been reduced so much that the dead vegetation lies on the surface in thick mats, through which nothing can push its way except an occasional plant of sorrel or a runner of Yorkshire fog or *Alopecurus pratensis*. Thus the surface tends to become covered with peaty patches bare of vegetation. As soon as lime is put on, the decomposition becomes more

rapid, the dead residues become decomposed and are cleared out of the way, so that the ground once more becomes covered with vegetation.

Persistent dryness produces the same effect with certain differences. In the first place the vegetation tends to be xerophytic, and the hard, narrow-leaved, waxy plants do not easily decompose, especially in the dry soil. The soil of a sandy common or woodland, for instance, often contains a considerable amount of nitrogenous organic matter, which, however, is mainly undecomposed pieces of bracken frond, etc.

Two distinct cases arise when the soil is too wet. In presence of calcium carbonate the general conditions favour a grassy type of vegetation which decomposes fairly well, and can at any time be made to go through the remainder of its stages in a normal way by making the conditions a little more favourable. These soils are therefore eminently suited for reclamation; they constitute the fen land.

Where, however, calcium carbonate is absent a much tougher type of vegetation arises—heathers, mosses, cotton grass, etc.—which even under the best conditions would not easily decompose, and under the conditions here obtaining only breaks down very slowly. Thick layers therefore accumulate, forming the great deposits of *Sphagnum*, etc., on the moors. As in the earlier cases, however, decomposition will proceed as soon as the conditions become favourable. Draining the moor removes the limiting factor and sets going the chain of processes; the peat may decompose right down to the solid rock or soil surface, or the processes may be stopped at some convenient stage, as in Bottomley's bacterized peat.

So far as evidence is available, it shows that the general decompositions of plant residues going on in the soil are substantially the same in all soils, but that the speed at which they take place varies, and may be slower than the speed at which the residues accumulate. These residues impart characteristic properties to the soils. It is thus possible to classify soils on the basis of the speed of decomposition as follows:

DECOMPOSITION OF RESIDUES QUICKER THAN ACCUMULATION	DECOMPOSITION OF RESIDUES SLOWER THAN RATE OF ACCUMULATION			
	Delayed by dryness	Delayed by excessive wetness		Delayed by cold
Normal soils		Calcium carbonate lacking	Calcium carbonate present	
Sands Loams Clays	Heaths Steppes	Peats Moors	Fen Black soils	Tundra

This scheme has the advantage of bringing out the fundamental law that the properties of a given soil are determined largely by its history. The climate to which it has been exposed plays a controlling part in determining the vegetation it carried in the past, while both factors determine the vegetation it can carry to-day.

One final reflection suggests itself. This cycle of change on which depends the success of our crops and our gardens is the work of soil organisms, but it is hardly likely to be able to be the sole work of all the great variety one finds there. Can we step in and control the process, and make the organisms more useful? The idea of sitting down and directing things instead of labouring to do them has always been one of the laudable ambitions of mankind, and efforts have not been wanting to control the soil bacteria.

The attempt began some twenty-five years ago, when it was found that leguminous plants could be made to grow on the most sterile sand, manured only with calcium carbonate, potash, and phosphates, by the simple expedient of inoculating with the necessary bacteria. Nothing is easier than to put bacteria into the soil, and it was thought that if nothing else were needed then truly the golden age had come to the husbandman. The desire to get something for nothing is deeply implanted in the human breast, and here seemed to be fulfilment complete beyond the wildest hopes of the most visionary schemers. Unfortunately, inoculation has not come up to expectations: before it can hope to succeed all the soil conditions have to be made favourable both to the organisms and the plant; drainage,

cultivation, supply of calcium carbonate, phosphates, potassium salts, moisture, suitable temperature, depth of soil all have to be provided, and by the time this done the soil has generally been so greatly improved that inoculation is unnecessary. A few successful cases are on record where it may be presumed the necessary organisms were entirely lacking from the soil, but they are the exception and not the rule.

More recently it has been found that the useful organisms are on the whole more resistant to adverse conditions than the useless or harmful ones, and therefore that any process of gentle killing or partial sterilization will effect an improvement. Experience is bearing this out, but it is also demonstrating that the process cannot be carried out without considerable trouble. "Truly," says Virgil, "the farmer's path is not an easy one;" and in that still older Book the cultivator was told "in the sweat of thy face shalt thou eat bread." So far I cannot see that modern science promises any short and easy way of getting around this old injunction. What it has done is to dignify the husbandman's calling by revealing something of the wonder and beauty of the factors involved: it has shown also how his labour may be better directed as his knowledge of the forces of Nature becomes more and more extended.

The conclusion to which we were led in our last lecture was that the decomposition of the residue of plant materials in the soil is of fundamental importance in soil fertility, determining on the one hand the production of necessary plant nutrients and on the other the extent of the accumulation of organic matter in the soil, which in turn determines many of the soil properties.

We have now to study this decomposition a little more closely, and in particular to see how it is affected by changes in conditions such as commonly occur in nature.

We have seen that most of the changes can be brought about by a number of organisms. Thus the fixation of nitrogen may be effected by the aerobic *Azotobacter* or the anaerobic *Clostridium*. The production of ammonia can be brought about by moulds, by large bacilli, or by small micrococci, organisms differ-

ing considerably in their requirements. Thus the continuance of the decomposition is less dependent on the conditions than might *a priori* be expected, and if the reaction cannot be brought about by one set of organisms it can by another. Changes in conditions may alter the *speed* of the reaction or they may alter the agents bringing it about, but they have less effect on the *nature* of the change.

For example: the bacterial flora in acid soils devoid of calcium carbonate is very different from that in normal soils, but one cannot point to any reaction that is wholly suppressed in consequence. It was once thought that nitrification ceased, but later work shows that this reaction, sensitive as it is, still goes on, although at a greatly reduced speed.

It has not yet been found possible to connect the change with the agent—to say at any given moment which organisms are playing the most important part at that time.

The obvious method of studying the changes in the soil is to observe the growth of plants, but the phenomena involved are too complex to be readily interpreted.

For our present purpose we can follow the changes in the soil by three methods:

(1) Measuring the rate at which oxygen is absorbed or carbon dioxide is given off by the soil.

(2) Measuring the rate at which ammonia or nitrate is formed in the soil.

(3) Estimating the changes in numbers of bacteria in the soil.

The first two can be determined as accurately as is desired, but the accurate estimation of bacterial numbers is not yet possible and the values are comparative only; nevertheless they are of considerable value for our work.

First of all we may take it as a general rule that the soil organisms, being living creatures, are dependent on suitable temperatures and water supply, that they must have food, and also sources of energy to enable them not only to live but also to carry on those reactions which involve the accumulation of energy, or, in other words, resemble the rolling of a ball up a

hill. These are general requirements that can safely be predicted of any living organism. In addition there is the special requirement that has been discovered by experiment: the need for calcium carbonate, without which many soil organisms will not act efficiently.

The application of general rules to soil problems is a very treacherous business; it is commonly the unexpected that happens, and experimental confirmation is therefore required at every stage. In order to get at the general nature of the effect of temperature and moisture content on the decomposition process it is necessary to do experiments in the laboratory, where all the conditions can be carefully controlled. Experiment shows that the effect of rising temperature on the bacterial numbers is quite different from what one expects: instead of rising, the numbers remain fairly constant up to about 80°F., and then they begin to fall.

In like manner, increases in water content of the soil do not lead to regular increases in bacterial numbers; there is a rise at first, but it is not sustained. So in natural conditions the numbers of bacteria do not show the expected fluctuations in the rise in temperature or moisture content. The discrepancy has been traced to the circumstance that the soil population is complex and is not formed of bacteria only. The results do not show the effect of temperature or moisture supply on the whole soil population, but only on part of it, and they indicate a competition or a destructive effect. When the soil population is simplified by killing the less resistant forms one obtains much more consistent results. Thus soil which has been treated with mild poisons such as toluene shows the expected increase in bacterial numbers with rise in temperature or moisture.

These facts, and others which need not now be dealt with, indicate that the soil bacteria are subject to the operation of some limiting factor quite distinct from temperature, moisture content, or food supply, and I have in other papers argued that this limiting factor is to be found in the action of some of the less resistant and larger forms, such as the protozoa, which keep down the numbers of the bacteria. The hypothesis ex-

plains all the facts that have yet been ascertained, but so many kinds of protozoa have now been discovered in the soil that it is difficult to pick out the exact offenders and render the hypothesis more precise from the purely zoological standpoint. We shall find, however, that the simplest way of interpreting the phenomena is to recognize the complex nature of the soil population and to admit the possibility of competition among them, just as one has to admit it in the case of any other population. We shall run into great difficulties if we make the common mistake of supposing that all soil organisms are there for the express benefit of our plants and our crops.

The amount of nitrate production does increase with the temperature, and in this respect it differs from the numbers of bacteria. This is in accordance with expectation; up to a certain point an organism may be expected to do more work as the temperature rises, but the increase is not as great as one would get if the numbers increased as well.

When now we turn to the field conditions and try to follow the production of nitrate in the soil, matters are complicated by the fact that the nitrates produced do not all remain in the soil, but are liable to be washed out or taken up by plants. Analytical determinations, therefore, only give the difference between the amount formed and the amount lost; they do not show how much is actually produced, nor give the rate of productions that we desire to obtain. For some time we could see no way of getting over the difficulty, but a simple solution was ultimately found. It is evident that if the curves showing the amount of some other substance *produced in the same way as the nitrate, but lost in a different way*, are of the same general shape as the nitrate curves, then the shape is due mainly to the production factors; if, on the other hand, the two sets of curves are different in shape, then the loss factors control the situation. The carbon dioxide in the soil air satisfies these requirements; it is produced, like nitrates, by bacterial action, but it is lost largely by gaseous diffusion, and only in very wet weather by leaching. Carbon dioxide was therefore determined simultaneously with nitrates, and the curves show a marked similarity except that the increases in nitrate came

later. Thus we may conclude that the curves both for nitrate and carbon dioxide are in the main production curves.

The amount of carbon dioxide in the soil air, which, as we have just seen, indicates the rate at which it is produced, follows the soil temperature during the winter months, but not during the summer; indeed, during hot weather the amount is distinctly low. It does not show any very close connexion with the moisture content, but it is more closely related to the rainfall.

Thus it appears that rain does something more than add water to the soil, and an interesting problem is re-opened which has in the past occupied a great amount of attention from agricultural chemists. From time immemorial practical men have felt that rain had a fertilizing effect. Medieval writers attributed it to some aerial spirit or celestial nitre washed down. Liebig, more precise, put it down to ammonia. As a result of Liebig's support a vast number of analyses have been made of rain from all parts of the world, but all agree in showing that there is not enough ammonia present to make any practical difference.

To what, then, are we to attribute this marked effect of rain? In soil investigations the direct attack is often least effective; it is usually necessary to work around the problem and see it from another point of view. In this case help came from a rather unexpected quarter. During the course of other soil investigations it was found that soil particles possess two atmospheres: the free atmosphere in the soil pore spaces, and another atmosphere dissolved in the soil water or soil colloids.

TABLE SHOWING COMPOSITION AND VOLUME OF SOIL AIR AND ATMOSPHERE

SOIL AIR			
	Per cent		
	CO ₂	O ₂	N ₂
Free air.....	0.4	20.3	79.3
Dissolved air.....	98.0	—	2.0
THE ATMOSPHERE			
	0.03	20.97	79.0

The free atmosphere is very much like our own, except that it contains more carbon dioxide; it is eminently suitable for aerobic organisms. The dissolved atmosphere, however, is entirely different; it has not been fully investigated, but is known to be almost devoid of oxygen and to consist mainly of carbon dioxide and nitrogen. The fact that it exists in such close proximity to the free atmosphere shows that the oxygen is used up more rapidly than it is renewed, and this means that the plant roots and micro-organisms which are immersed in the soil water are perpetually in need of more oxygen. So far as we know there is no process in the soil that will hurry up this renewal of dissolved oxygen, and plants and micro-organisms alike are perpetually restricted by the lack of it.

Now rain is a saturated solution of oxygen, and when it falls on the soil it not only supplies the needful water but also renews the stock of dissolved oxygen and thus gives the micro-organisms and the plant roots a new lease of activity.

But the soil is not governed solely by the conditions that happen to obtain at the time being; it is profoundly influenced by those that have passed; indeed, one might go so far as to say that its properties are determined largely by its history. The shape, the size, and to a large extent the composition of the mineral particles are the result of forces that caused the fragments of rock to chip off long ages ago, and have governed their wanderings ever since. The nature of the organic matter depends on the past vegetation, and this in turn on the climate; the micro-organic population is determined by vegetation, climate, and other causes. The soil as we see it to-day is the result of changes and climates long since past as well as of those now present. In short, the soil is the embodiment of its past history and can only be studied properly in the light of its history.

This is equally true of the minor events. Changes in conditions do not cease to be effective as soon as the old conditions are restored; they leave their mark, which may persist for a long time and lead to very unexpected results. Experiments at Rothamsted and elsewhere have brought out the apparent paradox that *conditions harmful to life lead to greater bacterial*

activity as soon as they have passed, while conditions favourable to life finally cause decreased bacterial activity.

Thus, if a soil is dried for a time and then re-moistened, it becomes a better medium for the growth of plants and of bacteria, the production of nitrates is increased, and the supply of phosphate becomes more available. The bacterial numbers do not, however, undergo any visible change.

Productiveness of Soils Stored Dry

(Oats: Gedroix, 1908)

NO. OF YEARS OF STORAGE	NO MANURE	COMPLETE MANURE	COMPLETE WITHOUT NITROGEN	MANURE WITHOUT PHOSPHATE
0	10.3	83.5	13.5	11
1	17.8	83.9	32.3	19
3	24.6	90.9	23.6	35.4
5	25.0	102.8	32.2	42

When soil is exposed to severe cold there is an increase in nitrate production, and, in this case, in bacterial numbers also. Exposure to heat causes a similar change. Greater growth is commonly obtained wherever a bonfire has been made, and in India it has been the practice from time immemorial to heat the surface of the land before growing the rice crop. Volatile antiseptics are now known to have a like result.

The converse of the rule is also true: whenever a soil is well supplied with organic matter, with moisture, and kept well warmed, the bacterial numbers do not remain as high as might be expected, but on the contrary they tend to come down. After a time these soils fail to produce their full effect and they are said to become "sick." Instances occur in commercial glasshouses run at a high temperature where the soil after a season's use becomes unsuitable and is therefore thrown out, all its valuable manurial residues being sacrificed (fig. 65).

Sick soils have been examined in some detail, and the trouble was traced to at least two causes: an accumulation of disease organisms, and also an exaggerated activity of the factor limiting bacterial activity in ordinary soils.

These phenomena afford further evidence of competition among the soil organisms, and indicate that some of the groups, and especially those which are fairly readily killed, are detrimental to the useful soil bacteria.

Some of these changes affect the soil itself. The jelly-like substances—the colloids—shrink on drying, and may conceivably expose fresh particles of organic matter to the action of the organisms or liberate some of the phosphates they have absorbed. So also intense frost may split up some of the undecomposed organic matter and facilitate the work of the micro-organisms.

These observations throw important light on the effects of season and climate on the production of nitrate in the soil. It is notoriously difficult to generalize about seasonable effects, but as a general rule the activity of micro-organisms is greatest in late spring and in autumn, and lowest in summer and winter.

The winter minimum is easily intelligible: the low temperature limits the activities of the organisms, and, as we have already seen, any rise in temperature immediately evokes a response, so that the curves for the production of carbon dioxide run closely parallel to the temperature curve.

The spring maximum is remarkably interesting. It begins to show itself when the soil is drying after the cold and wetness of the winter, and when the sunny days first cause the temperature to rise. But it is the rain coming after warmth that causes the rush of life. Three factors seem to be involved. During winter the cold and the general unfavorable conditions have had their partial sterilizing effect upon the soil population, and also have resulted in a certain amount of disintegration of the soil organic matter. Everything is therefore ready for a great outburst of activity.

But in our climate this does not come suddenly. Before the soil can become warm it has to dry, and by the time it is warm enough for much bacterial action the chances are that it has dried too much. It is therefore necessary to wait for rain to supply the needful water and renew the dissolved oxygen in the water round the soil particles. It is this combination of temperature, moisture, and oxygen supply, following on the

beneficent changes effected in the winter months in the soil organic matter and the soil population, that causes the great outburst of soil life in the spring.

The explanation is new, but the facts have long been known to all observers.

Spring has always been recognized as the great time for life in the soil. "It is then," says Virgil, "that Aether, the Almighty Father of Nature, penetrates the womb of earth with his fruitful showers and, blending his mighty grame with hers, gives life to all the embryos within."*

The summer minimum may be attributed to dryness, and the autumn maximum to a repetition of the spring effects. In a moist warm summer, however, continued activity may occur right up to the point when "sickness" sets in, and the autumn maximum may not then arise.

In consequence of these various activities the soil is left pretty rich in nitrates at the end of the autumn provided the summer has been reasonably dry. If these remain they form a good supply for the young plants of the following season. But in a wet winter part is washed out and the young plant is deprived of some of its food. We thus have part of the explanation of the harmful effect of a wet winter, and one of the reasons why the husbandman in all ages has hoped for dry winters. "A wet summer and a fine winter," to quote again from the Georgics, "should be the farmer's prayer. From winter dust comes great joy to the corn, joy to the land. No tillage gives Mysia such cause for boasting, or Gargarus for wondering at his own harvest."† English farmers would ask for the wet spring instead of the wet summer, but they would agree en-

*"Vere tument terrae et genitalia semina poscunt.

Tum pater omnipotens fecundis imbribus Aether
Coniugis in gremium laetae descendit, et omnis
Magnus alit magno commixtus corpore fetus."

Georgics, Bk. II. ll. 324-327.

†"Umida solstitia atque hiemes orate serenas,

Agricolae; hiberno laetissima pulvere farra,
Laetus ager: nullo tantum se Mysia cultu
Iactat et ipsa suas mirantur Gargara messes."

Georgics, Bk. I. ll. 100-103.

tirely as to the winter, and out of their experience they have evolved a variety of similar expressions. Again the man of science has annotated the poet, and Sir William Shaw has worked out a mathematical expression showing how much damage is done on an average by winter rain.

The trouble can be met by a system of green manuring, whereby plants are grown in the autumn to take up the nitrates and are then ploughed into the land ready for the operation of the soil organisms in spring. The system is very sound, and as soon as it is sufficiently developed to fit in with our present rotation it may be confidently expected to play a considerable part in helping the farmer to struggle against bad weather.

TABLE SHOWING THE EFFECT OF WET AND DRY WINTERS RESPECTIVELY ON THE YIELD OF CORN AT ROTHAMSTED

—	RAINFALL OCTOBER-MARCH	YIELD OF GRAIN, BUSHELS TO THE ACRE		
		Ammonium salts applied		Difference in favour of spring dressing
		In autumn	In spring	
¹ Dry winter.....	11.73	31.8	32.5	0.7
¹ Wet winter.....	16.73	27.5	32.5	5.0
		Total produce (grain and straw),		lb. to the acre
Dry winter.....	11.73	5,631	5,829	196
Wet winter.....	16.73	4,932	6,004	1,072

¹ The dry winters were those preceding the harvests of 1889, '90, '91, '93, '98, 1901, '02, '03, '05, '06, '09, for which the results are averaged here; the wet winters were those preceding the harvest of 1892, '94, '95, '96, '97, 1900, '07, '08, '10, '11.

We must now leave these interesting weather problems, and turn to the other factors affecting the activity of the soil bacteria.

Calcium carbonate is absolutely essential to the activities of soil bacteria, and the soil is not a good medium for bacterial activity until it has absorbed or combined with as much as it can. It is impossible to say why: one can only state the fact, and in the expressive language of the practised man say that the soil is "sour." Either calcium carbonate or calcium oxide

(quick-lime) may be used, and for long it was supposed that both acted in substantially the same manner. Dr. Hutchinson has recently shown, however, that there is a fundamental distinction between the two, in that quicklime is a partial sterilizing agent having the same effect on soil as any other partial sterilizing agent, causing first a depression and then an increase in bacterial numbers and in ammonia production, while chalk has no such effect.

It is often said that the value of calcium carbonate is to neutralize acids which would otherwise form in the soil, and there is some probability, although little evidence, for the supposition. Organic acids may be formed in the decomposition processes, and we know that practically all calcium salts of organic acids decompose without difficulty with re-formation of calcium carbonate. It is possible, therefore, that the carbonate plays as it were the part of a lubricant coming into the cycle to help over a difficult stage.

It is also been asserted that toxins are present in the soil which after a time stop the further action of the organisms. There is no evidence of this, excepting that most dangerous argument of all—the argument from analogy. When a bacterial culture is made on an artificial medium in the laboratory the organisms go on developing for a time and then stop, being brought to a standstill by an accumulation of decomposition products with which they cannot deal. It is argued that the same thing must go on in the soil, and that the accumulation here must have a toxic effect just as it does in the artificial culture.

There is, however, this fundamental distinction between the laboratory culture and the soil. In the laboratory culture the medium is made up to deal with one class of organisms only; as soon, therefore, as substances accumulate which this class cannot decompose the whole action automatically comes to an end. But in the soil there is a great variety of organisms capable of attacking a considerable variety of organic substances: so great indeed that it is difficult to understand how any intermediate decomposition product could accumulate sufficiently to interfere with bacterial activity. The final product of all—

the nitrate—is so easily washed out from the soil that it rarely if ever, accumulates under normal conditions.

The argument in favour of bacteriotoxins deduced from the analogy of laboratory cultures is therefore devoid of foundation, and we must rely simply on the direct experimental evidence. Of this there is practically none, all sound experiments giving negative results. Negative evidence is notoriously unsatisfying, but until some positive evidence is forthcoming we cannot suppose that bacteriotoxins play any notable part in the soil.

There is, however, considerable evidence that the growing plant exerts a depressing effect on the soil organisms. Rigid comparisons are not easy, but when the conditions on a fallow plot are made to approximate as closely as is possible to a cropped plot it is found that there is more activity on the fallow plot.

This has been observed at various places: at Rothamsted, at Ithaca, at Pusa and elsewhere in ordinary arable soils, and it was noticed by Harrison in his studies of paddy soils. It is not clear from the experiments how the action takes place: whether the plant simply exercises some indirect action on the temperature or moisture supply, or whether it directly affects the soil organisms. On the whole the evidence rather tends to indicate a direct action such as might be brought about by some poison given off from the root or left by the plant, or such as would result from the removal by the plant of some substances necessary to the bacteria.

Further experimental work is in hand on this matter. The effect of the plant on soil bacteria recalls the remarkable effect of one growing crop on another observed by Mr. Pickering. It is obviously impossible to say that these effects are identical, but we may reasonably hope that the further investigation of each of these problems will throw helpful light on the other.

A Garden of Ten Centuries

By Frank A. Arnold



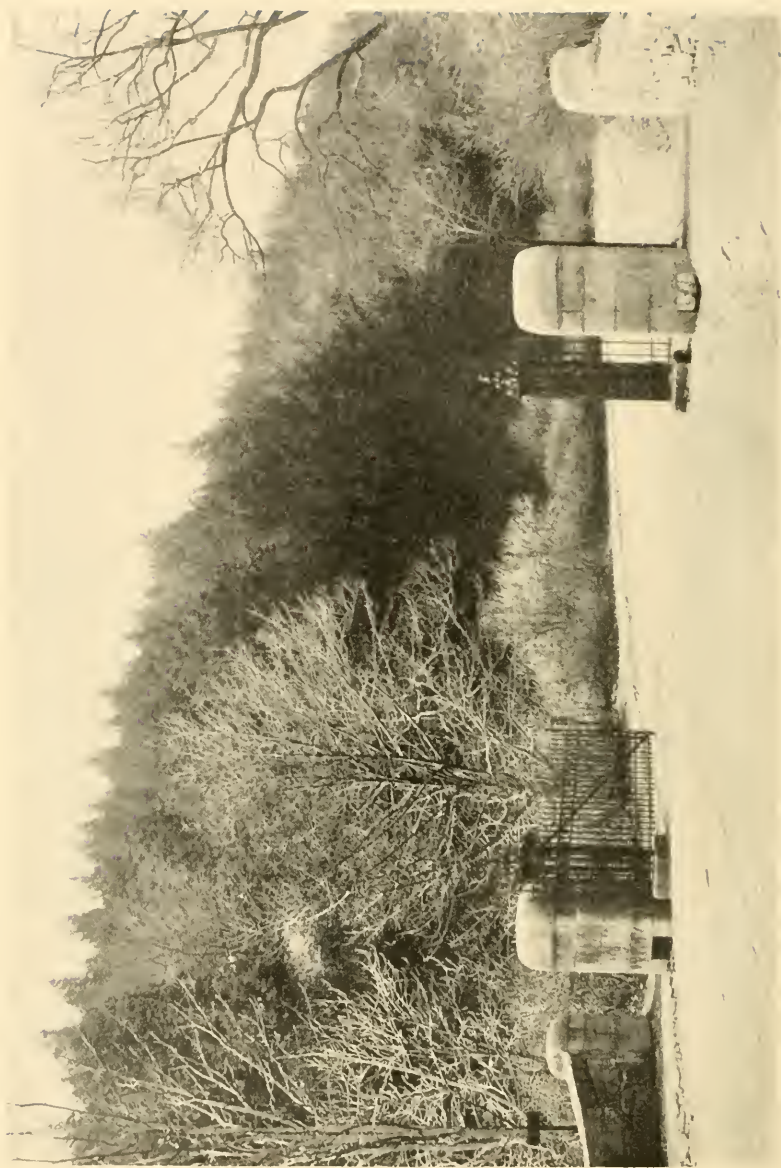
WE SPEAK of family life in the terms of a generation: of national life in the terms of a century; but who ever heard a garden described in terms of a thousand years?

There is probably only one garden in the world to which this would even remotely apply for as far as our knowledge goes, there is nowhere existent an arrangement for the perpetuating of a garden, for a thousand years similar to that which is enjoyed by the Arnold Arboretum of Harvard University.

Located in suburban Boston less than a half hour distant from the State House, on the edge of West Roxbury, and near the Forest Hills Station, lies 220 acres of land devoted to the most unique as well as the most beautiful Tree Museum this country, or in fact, the world has ever possessed. Near enough the city to be a part of it, and yet, far enough from it to be removed from the bustle and hurry of business, may be found a spot where one may enjoy the unusual pleasure of seeing every form of tree and woody plant, which will stand the climate of New England, gathered from all over the world, and growing under much the same conditions as would be found in their original habitat.

Comparatively few people, as the world goes, know of the Arboretum and its work, and still fewer know of its almost romantic origin. In the year 1870 a prosperous merchant of New Bedford, James Arnold by name, died, leaving in the hands of his executors, the sum of one hundred thousand dollars to be devoted as they might see fit, to increasing the knowledge of horticulture or agriculture.

It so happened that one of the trustees of this will, George B. Emerson by name, was greatly interested in the subject of



ENTRANCE TO THE
ARNOLD ARBORETUM

trees, having at one time prepared a most excellent report on the trees of Massachusetts. Feeling that an opportunity already existed which would be increasingly appreciated by future generations for encouraging knowledge about trees, shrubs, and woody plants he brought matters to a point where he made the following proposition to Harvard University:

It was suggested that a Professorship of Arboriculture be created and that a portion of the so called Bussey Farm, which Harvard University then owned, be made available for the purpose of tree culture with the understanding that the Arnold bequest would be turned over to the University as the nucleus for carrying out the plan in a large way. The bequest was accepted, Professor Charles Sprague Sargent appointed to the professorship, the new venture given the name of the donor and called the Arnold Arboretum.

A little later due to the unceasing labors of Professor Sargent, a most extraordinary arrangement was made with the City of Boston, whereby in consideration of a deed to the City of the land occupied by the Arboretum, it agreed to build and maintain the walks and driveways, assume all taxes, afford police protection and in every way safeguard the property. Moreover the City agreed to lease this same property back to Harvard University for the purposes of the Arnold Arboretum in consideration of one dollar a year for a period of nine hundred and ninety-nine years, said lease carrying a clause, whereby at the expiration of this period the lease would automatically renew itself and so on at each period of expiration in perpetuity. It will therefore be apparent, even to the most casual reader, that by the terms of this unusual document there was immediately obtained for the Arboretum the safeguarding of the property by the City of Boston, freedom from taxes, and maintenance of the walks and drives, while at the same time it obtained the institutional standing guaranteed it as a part of Harvard University; this arrangement, however, not interfering with or abridging in the slightest the work of the Arboretum from a scientific standpoint. The only condition exacted by the City of Boston was that the grounds should be open to the



BUSSEY BROOK AT THE
FOOT OF HEMLOCK HILL
ARNOLD ARBORETUM



THOUSANDS VISIT THE LILAC
DRIVE EACH YEAR
ARNOLD ARBORETUM

general public as a part of its park system from sunrise to sunset every day in the year.

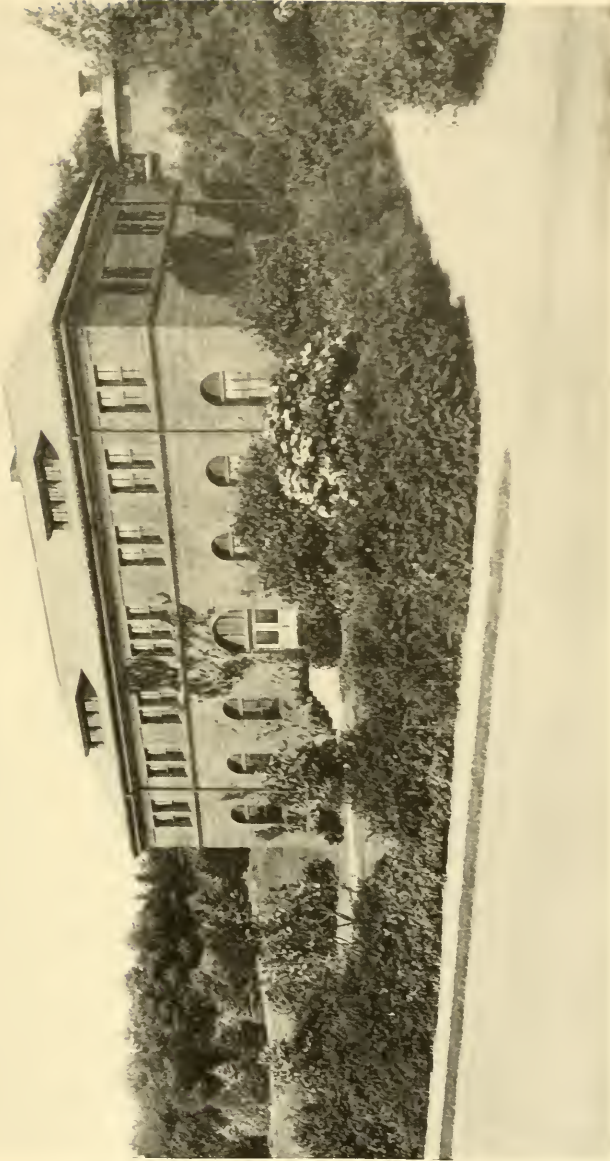
From this modest beginning, with very little in the way of material resources and with a tract of land almost a wilderness in its physical condition, has grown one of the most beautiful Tree Gardens in the world, both from the standpoint of the things to be seen as well as the remarkable way in which the various arrangements have been carried out.

To attempt to describe the thousands upon thousands of specimens to be found in this garden, ranging from the tiny seedling to the massive pines on Hemlock Hill, would be impossible within the compass of an ordinary article. One might wander for hours along the well kept drives or across neatly kept grass paths, enjoying the beautiful lilacs in their season, the laurel and the flowering dogwood on the hillside, great masses of wild roses growing in their native beauty, the flowering trees both native and imported of such variety as to literally afford a specimen of some sort or other every month in the year; for it must be borne in mind that one of the objects of the Arboretum has been to obtain, not only from this country, but from all over the world, every known species of trees, shrubs, or woody plants which would survive the climate of eastern New England.

The world has been literally searched for specimens to bring this about, until we are told that today there is no spot containing as many species of trees and shrubs within the compass of any one garden as are found in the Arnold Arboretum.

Nor is this all, for as the visitor enters one of the many beautiful entrances, he comes upon an attractive administration building donated by that great friend of horticulture, H. H. Hunnewell, containing not only the offices of the director and his assistants, but also a museum, herbarium, and a wonderful library of 32,000 volumes, said to be the most complete of its kind in the world.

In this administration building Professor Sargent and his corps of workers have been busily engaged for many years. It was from this work shop that there was given to the world



THE ADMINISTRATION BUILDING
CONTAINING LIBRARY AND HERBARIUM
ARNOLD ARBORETUM



THE JUNIPER COLLECTION
ARNOLD ARBORETUM

Professor Sargent's masterpiece, the *Sylva of North America*, a wonderful work in fourteen large quarto volumes representing the most complete exposition of the subject this country has ever known. If Professor Sargent had never done anything else for science than the production of this masterpiece, he would have left a monument to posterity of which anyone might well be proud. But this is only one of his many achievements. He was for many years the sponsor of that excellent magazine *Garden and Forest*. A Manual of the trees of North America was also produced within these walls, and at this writing, there is nearing completion a bibliography of all the books and pamphlets relative to trees published in every civilized country of the world, which will be the only work of its kind extant, representing an incalculable amount of labor and research.

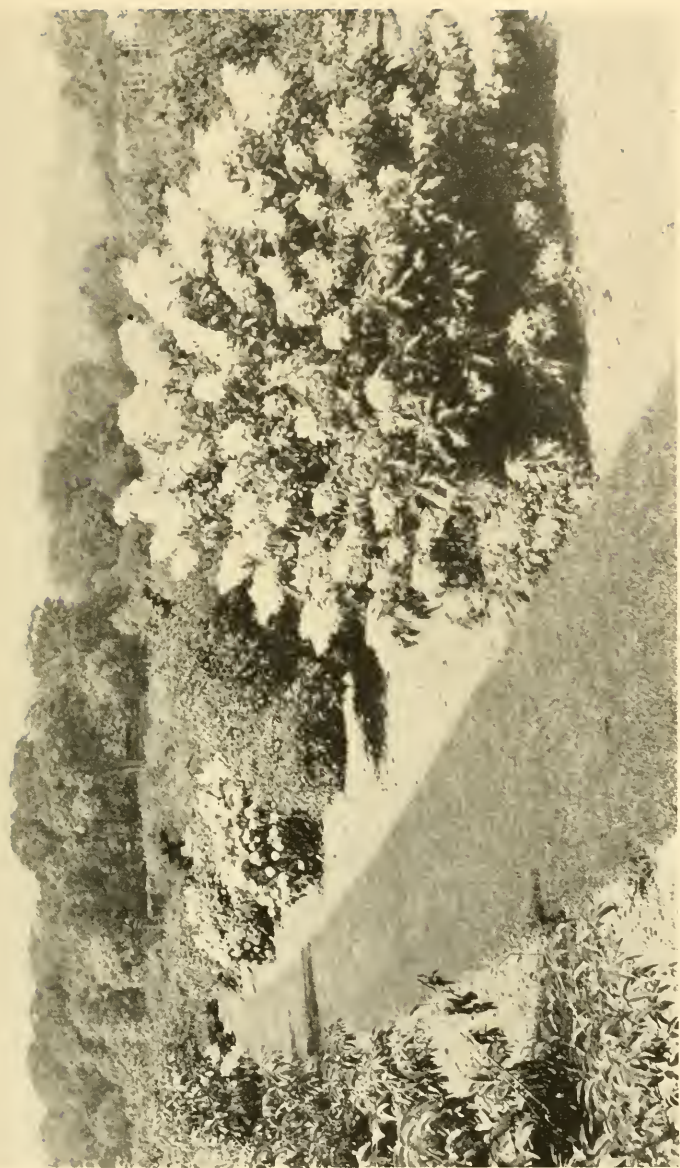
Someone connected with the Arboretum is always on the lookout for new things to be added to its collection. Perhaps the most industrious worker along this line in recent years has been Professor Sargent's associate, E. H. Wilson, who has spent many years abroad in this service, and who is at present in China and Japan exploring sections of the country previously unknown to white men and sending back seeds, cuttings, and photographs of specimens to be added to the already wonderful collection at home.

The Arboretum does not keep all of the good things for itself, but is distributing to nurseries, public parks, and gardens, thousands of its own excess plants and trees, a phase of the work which will be continued as long as the need exists. In fact the proposition has been one of giving from the very start and because Professor Sargent's friends have felt that he was doing a fine piece of work for future generations, they have given liberally of their means for developing of this institution, until today we have a finished product, of which the nation may well be proud.

To turn 220 acres, the present area, from a stretch of meadow, upland, and hillside into a well developed, beautifully laid out, and wonderfully attractive tree garden, is not only a work of



CHARLES SPRAGUE SARGENT
DIRECTOR, ARNOLD ARBORETUM



HYDRANGEA COLLECTION
H. PANICULATA PRAECOX
IN FOREGROUND



THE PINETUM
ARNOLD ARBORETUM

art creditable to that master landscape architect, Frederick Law Olmsted, but ever and above all it reflects the loving care and attention of the master gardener who was a lover of trees in his father's garden before he ever dreamed of becoming a professor and an eminent authority on dendrology.

To many people, a tree is almost a living thing and represents an individuality comparable only to a human being. The love of trees and their appreciation and enjoyment is being reflected more and more in the life of our American people. To unnecessarily cut down a tree is almost a sacrilege. To plant a tree is looked upon as an act worthy of commemoration in many of our states by the establishment of an Arbor Day. Little by little we are being brought to a realizing sense of the many ways in which nature is speaking to this busy world. As we grow older we appreciate more and more the message which comes to us from the pines of Hemlock Hill, or from the blossom burdened cherry trees, or perhaps impressed upon our consciousness by the presence of a commanding oak a century old.

In this age of commercialism, one can fully imagine a situation which might turn many of our public gardens and parks into building sites for public utilities, or where the encroachment of steadily crowded civilization might demand these spaces for domestic or commercial purposes; but while men may come and men may go, the Arnold Arboretum will continue on forever regardless of the demands or changes which time may bring about, the one free breathing spot among the trees of which the nation is positively assured and which will be preserved forever for the purposes to which it has been dedicated.

Notes from the Arnold Arboretum^{*}

By Charles Sprague Sargent



UONYMUS YEDOENSIS. The fruit of few other plants in the Arboretum is more beautiful than that of this *Euonymus*. It is a large, vigorous, hardy, tree-like shrub or small tree with a short trunk and wide-spreading branches which form a symmetrical round-topped head.

The leaves are unusually large for a plant of this genus and, having turned yellow, have now nearly all disappeared, leaving in full sight the fruit which covers the branches from end to end. It is rose color, about half of an inch in diameter, that is unusually large for that of an *Euonymus*, and as it opens shows the bright scarlet shining seeds. This was one of the plants sent direct to the United States from Japan between 1860 and 1870, and has been growing in the Arboretum for fully thirty years. It is still, however, little known, and rare in American and European gardens. There are several specimens, large and small, in the *Euonymus* Group on the right-hand side of the Meadow Road which is better worth a visit late in the autumn than at any other time of the year.

EUONYMUS EUROPÆUS. This, the Burning Bush as the English call it, is a widely distributed and variable European shrub or small tree. The fact that the leaves usually remain green or nearly green on the branches until after the fruit has colored and opened adds to its beauty. The fruit is about two-thirds the size of that of *E. yedoensis* and deep dull red with lustrous bright orange-colored seeds. There are several forms of this small tree in the collection. One of the handsomest of

^{*} Reprinted from various numbers of the *Bulletin* issued by the Arboretum.

these has been raised here from seeds sent to the Arboretum from Hungary. On this form the leaves are now (late autumn) dark purple on the upper side and green below. With this are plants of the variety *ovatus* with leaves as fresh and green as they were at midsummer.

THE JAPANESE YEW. The value of this plant for the northern states has been pointed out before, and as the years pass its hardiness and value are confirmed by longer trial. There are three or four quite distinct forms of this plant. The one probably most often seen here grows as a large, vase-shaped shrub with several spreading stems. Plants of this sort have been raised in the Arboretum from the seeds of tall forest trees collected by Professor Sargent in Hokkaido. Among these plants there are some which are beginning to develop a single leader and promise to grow into trees. There is another form which is grown in some American nurseries under the unpublished name of variety *capitata*. This is merely a seminal form which begins to grow with a single leader with treelike habit as soon as the seeds germinate. For those who want the Japanese Yew in the form of a tree rather than a bush this form will best produce the desired results. Another bushy form with wide-spreading, nearly horizontal branches, which on plants thirty or forty years old often turn up at the ends and darker green leaves, is often seen in American gardens in which specimens only four or five feet high but sometimes twenty feet in diameter are found. In this country this variety is generally called variety *brevifolia*, but the correct name for it is var. *nana*. A dwarf, round-topped plant (var. *compacta*) is the smallest and most compact of all the forms of the Japanese Yew in this country. A good plant of this dwarf form can be seen in the Arboretum collection where it has been growing for many years. Plants intermediate between the varieties *compacta* and *nana*, differing in size and habit, are sometimes found in American gardens. What is probably the largest Japanese Yew in the United States is one of the bushy vase-shaped plants which was planted about 1870 by Dr. George R. Hall in his garden in Warren on Bristol Neck, Rhode Island.



PYRAMIDAL FORM OF
WHITE PINE (*P. STROBUS*)
ARNOLD ARBORETUM

In October, 1889, this plant was twelve feet high and covered a space on the ground of forty feet round. In October, 1916, twenty-seven years later, it is twenty-two feet tall and covers a space one hundred and thirty-two feet round. In 1887 there were only a few fruits on this Yew, but this year it is bearing such a great crop that the berries make the whole plant look red. The foliage unfortunately is not dense, and the plant is evidently failing, probably from insufficient nourishment. The Japanese Yew is now reported to be perfectly hardy in central New Hampshire and in Minneapolis, Minnesota, parts of the country where the winter cold is much greater than it is in eastern Massachusetts, and there is no reason to doubt the statement which has been made that this Yew is the most valuable plant which Japan has furnished our North Atlantic states.

PINES. Among exotic Pines the three Japanese species, *Pinus parviflora*, *P. Thunbergii* and *P. densiflora*, have all grown well here in this climate for nearly thirty years and are still handsome and attractive trees of much promise. The Scotch Pine (*Pinus sylvestris*) and the Austrian Pine (*P. nigra*) are perfectly hardy and grow rapidly in this climate, but they are comparatively short-lived trees here and do not promise to be so valuable as the Japanese species. The White Pine of the Balkan peninsula (*Pinus peuce*) is very hardy here, producing its cones freely, and now promises to be a large and valuable tree. The Swiss Pine (*P. cembra*) is hardy but grows very slowly but it is possible that the form of this tree from central Siberia may prove more successful in this climate. The Asiatic representative of this Pine, *Pinus koraiensis*, from eastern Siberia, Korea and Japan, grows well here and produces its cones freely. Of the Pines of western America *Pinus flexilis* of the Rocky Mountain region grows slowly in the Arboretum but is healthy and perfectly hardy, as are the two White Pines, *P. Lambertiana*, the great Sugar Pine of California and Oregon and *P. monticola* which ranges from Idaho to the coast of British Columbia and to the high Sierras of California.

EASTERN ASIATIC CHERRIES. During the last few years the Arboretum has been engaged in studying the Cherry-trees of eastern Asia, and has assembled a large collection of these plants, including most of the species and all of the forms with double and otherwise abnormal flowers which are popular garden plants in Japan where the flowering of these trees is celebrated by national rejoicings. All the world has heard of the Japanese Cherry-blossoms, and travellers in the East usually so arrange their journeys that they can be in Tokyo when the white flowers of fifty thousand trees of the Yoshino-zakura (*Prunus yedoensis*) make a day of thanksgiving, and the great trees in the long avenue of Cherry-trees (*P. serrulata*) at Koganei are covered with their rose-colored flowers. Well known to travellers, too, are the avenues of Cherry-trees at Arashi-yama near Kyoto and at Yoshino near Mara. The Cherry-trees which mean so much to the Japanese and delight all foreigners who visit Japan in early spring are perfectly hardy, and easy to grow here in New England; and it is unfortunate that there is no hillside in the Arboretum which can be covered with these trees or no space where a long avenue of them can be planted, for the flowering of a great number of these trees might become as great a joy to the people of Boston as they are in Japan. Such collections of Cherry-trees might well form a part of the equipment for pleasure and instruction in all the northern cities of the country, but up to this time only Rochester, New York, is arranging to make a plantation of these trees to cover many acres of rolling hills in its great park on the shores of Lake Ontario. In the Arboretum only room for a few isolated individuals has been found, but most of the species are now established here and some of them have bloomed for several years.

PRUNUS SUBHIRTILLA. This is the Japanese Spring Cherry which Mr. Wilson, after a year devoted in Japan to the study of Cherry-trees, calls "the most florifrous and perhaps the most delightful of all Japanese Cherries." It is a large, low-branched shrub rather than a tree and is not known as a wild plant. This Cherry is much planted in western Japan from northern Hondo



PRUNUS SUBHIRTELLA
ARNOLD ARBORETUM

southward, but it is not much grown in the eastern part of the Empire and is rarely found in Tokyo gardens. For this reason and as it does not reproduce itself from seed *Prunus subhirtella* is still rare in American and European collections. There are large plants in the Arboretum collection where they have been growing since 1894 and where, covered with their drooping pink flowers, they are objects of wonderful beauty. The value of *Prunus subhirtella* is increased by the fact that the flowers often remain in good condition for ten or twelve days, and longer than those of the other single-flowered Cherry-trees. This Cherry can be raised from soft wood cuttings and by grafting on its own seedlings. These will grow into tall trees with long straight trunks (*Prunus subhirtella*, var. *ascendens*) and in Japanese temple gardens are sometimes fifty feet high with trunks two feet in diameter. This is a common tree in the forests of central Japan, and grows also in southern Korea and central China. Until Wilson's investigations in Japan in 1914 this tree seems to have been entirely unknown in western gardens. Raised from the seeds of *Prunus subhirtella*, which are produced in large quantities every year, it grows here rapidly and proves to be a handsome tree. It has the drooping flowers of the well-known *Prunus pendula* of gardens which is only a seedling form of *P. subhirtella ascendens* and for which the correct name is *Prunus subhirtella* variety *pendula*. This tree is not known to grow wild, but has for centuries decorated courtyards and temple grounds in central and northern Japan. The largest tree seen by Wilson was sixty-five feet tall with a head as broad as the height of the tree. There is a form of *P. subhirtella* (var. *autumnalis*) with semidouble flowers which blooms in both spring and autumn. This is a shrub often cultivated in Tokyo gardens, and in the Arboretum first flowered in May, 1915.

PRUNUS YEDOENSIS. This is the Cherry-tree which has been most generally planted in Tokyo. It is a small tree with smooth pale gray bark, wide-spreading branches, and large pale pink or white flowers which usually open before the leaves unfold. No old trees are known in Japan, and the origin of this

Cherry is uncertain. It has not been found growing wild in Japan, and Wilson after studying it in Tokyo was inclined to believe that it was a hybrid. But, whatever its origin, it is a hardy tree which produces beautiful flowers and should be better known in this country and in Europe.

PRUNUS SERRULATA, VAR. SACHALINENSIS. This tree, which was called *Prunus Sargentii* until it was discovered that it had an older name, is believed to be the handsomest of the large Cherry-trees of eastern Asia. In the forests of northern Japan and Saghalin it is a tree often seventy-five feet high, with a trunk four feet in diameter; it has large pale pink or rose-colored single flowers, large dark green leaves which are deep bronze color as they unfold with the opening flower-buds, and small globose fruits which are bright red at first when fully grown and become black and lustrous when ripe. In western countries this tree was first raised in the Arboretum in 1890 from seeds sent here by Dr. William Sturgis Bigelow, of Boston, and of the trees introduced by the Arboretum there is none of greater beauty. It has been found that the seedlings of this tree are the best stock on which to graft most of the double-flowered Cherries which are so highly prized by Japanese gardeners, and that the reason why these plants have never been successfully grown in the United States or Europe is due to the fact that Japanese gardeners do not use a suitable stock for them. Some seventy-five named varieties of these Cherries with double or otherwise abnormal flowers, cultivated in Japan, are now in the Arboretum where they are being propagated. Among them are fifteen named varieties of the Sargent Cherry, and among these are some of the most beautiful of all flowering trees hardy in this climate and evidently destined, although still little known, to become important features in American gardens. Two of the handsomest of these double-flowered varieties of the Sargent Cherry are the forms *albo-rosea* and *Fugenzo*; the former has large rose-colored flowers changing to white as they open, and the other rose-pink flowers; this is well known in English gardens under the name of *James H. Veitch*. These two Cherries differ from the other Japanese double-flowered

forms in the presence of two leafy carpels in the center of the flowers.

European and North American Cherries bloom a few days later than those from eastern Asia, and can be seen near them on the right hand side of the Forest Hills Road from that entrance to beyond its junction with the Meadow Road.

PROSTRATE JUNIPERS. This general name is given to a number of low-growing Junipers with wide-spreading branches lying close to the ground and forming broad mats. For covering banks, the margins of ponds or beds of larger conifers they are useful and are much used in some parts of the country, although there is still a great deal of confusion in commercial nurseries about the identity and correct names of these Junipers.

THE PROSTRATE RED CEDAR. This is perhaps the handsomest of all these plants. On exposed parts of the wind-swept cliffs near Ogunquit and at Kennebunkport, Maine, this Juniper grows only about two feet high, with branches extending over a diameter of eighteen or twenty feet, their ends lying flat on the ground. At Kennebunkport, in a position not fully exposed to the wind, one of these plants has formed a short stem about two feet high from the summit of which start branches spreading horizontally and forming a broad head. Whether the dwarf habit of these Junipers is due to the exposed position where they grow or not cannot be determined until plants are raised from seeds produced by them, for it is possible such seedlings may assume the ordinary upright habit of this tree. The fact that such prostrate plants sometimes occur at a distance from the coast, as in Lexington, Massachusetts, indicates perhaps that the prostrate form has become fixed, as it is in the case of prostrate forms of some other Junipers. Dwarf forms of *Juniperus virginiana* are described in German books on trees under the name of *Juniperus virginiana repens* or *J. virginiana horizontalis*, but the Arboretum has no information about these plants and it is impossible to determine if they are similar to the prostrate plants of the Maine coast which possibly are still without a name. In this country the prostrate *Juniperus virginiana* is not known in cultivation, and in this

Arboretum there are only a few small grafted plants of the tall-stemmed specimen at Kennebunkport. This Juniper well deserves the attention of the lovers of hardy conifers.

JUNIPERUS PROCUMBENS. This is the best known of the prostrate Junipers which Japan has sent to the gardens of the west. It is a plant with wide-spreading procumbent stems, blue-green, sharply pointed leaves marked on the upper surface by two white lines. The fruit is not known. This Juniper finds a place in nearly every Japanese garden, but it must be a rare and probably local plant in its distribution as a wild plant was not seen by Wilson during his extended travels in Japan. It is said to have been introduced into Great Britain before the middle of the last century but was soon lost from European gardens until it was reintroduced in 1893. This Juniper is largely used as a garden plant in California where it is imported from Japan, and less commonly in the eastern states. It is perfectly hardy and well established in the Arboretum, and can be seen with the other Junipers. This Japanese Juniper is closely related to the prostrate Juniper of western China and the Himalayan *J. squamata*, a plant with awl-shaped, sharply pointed leaves in clusters of three, and dark purple-black berries. Plants from western China can be seen in the Arboretum.

JUNIPERUS CHINENSIS, VAR. *SARGENTII*. This dwarf form of a wild tree of China and Japan appears to have been first collected by Professor Sargent near Mororan in southern Hokkaido in the autumn of 1892, and the plants raised from the seeds which he collected at that time are probably the only ones in cultivation. This Juniper forms a low dense mat of wide-spreading branches covered with small, dark green, scale-like leaves, mixed with pointed ones. It finds its most southern home on the high mountains of northern Hondo; it is more abundant in Hokkaido where it sometimes descends to the sea-level and ranges northward to Saghalin and the more southern Kurile Islands. In the Arboretum it is now the handsomest of the prostrate Junipers. It can be seen here to advantage on the Hemlock Hill Road opposite the Laurels where several



JUNIPERUS CHINENSIS SARGENTII
ARNOLD ARBORETUM

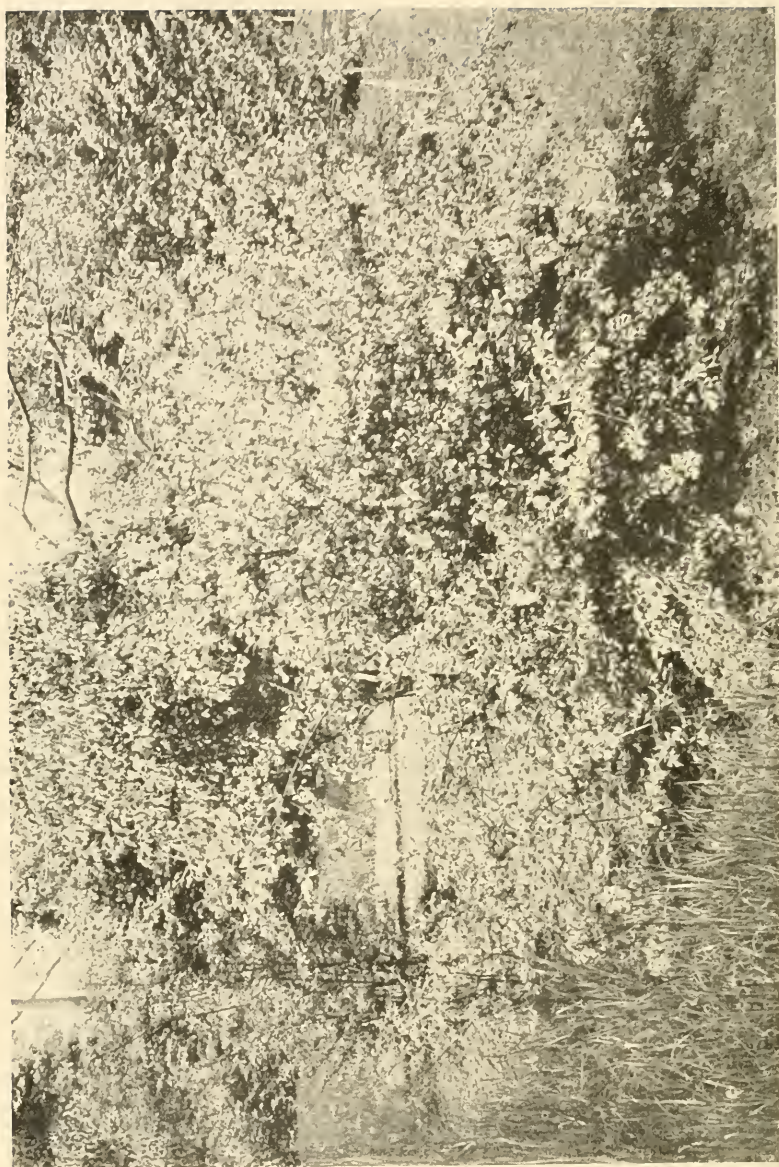
plants form a large mass and show considerable seminal variation. There are also three large plants on the eastern slope of the knoll on which the general Juniper Collection is planted.

DOUBLE-FLOWERED CHERRIES. Small plants covered with flowers of two of the handsomest of the double-flowered Japanese Cherries can be seen in the Cherry Collection on the right-hand side of the Forest Hills Road. They are varieties of *Prunus serrulata*, var. *sachalinensis*, the so-called Sargent Cherry, and are named *Fugenzo* and *albo-rosea*. The first has rose-pink flowers and bronze-colored young leaves, and is believed to be one of the most beautiful of all double-flowered Cherries. This plant has become common in English gardens under the name of "James H. Veitch." In Japan it is called "kofugen" or "benifugen." The form *albo-rosea* has pink flower-buds which become white as the flowers open. Like those of the form *Fugenzo* the flowers have two green leafy carpels in the centre and these distinguish these two varieties from all the other Japanese double-flowered Cherries. There are twelve other double-flowered forms of the Sargent Cherry among the seventy-five varieties of different species of Cherries cultivated by the Japanese for the beauty of their flowers and introduced into the Arboretum by Wilson two years ago. In the last fifty years many attempts have been made to cultivate some of these plants in the United States and Europe but with no great success, and they are now imported in considerable numbers every year into the United States from Japanese nurseries. Such plants, however, are short-lived and unsatisfactory and from studies of these Cherries in Japan Mr. Wilson became convinced that it was the stock on which they were worked in Japan as well as in the United States and Europe that was the cause of their failure, and that the only hardy, long-lived reliable stock for them was the wild type of the Sargent Cherry. If his conclusions are correct, there seems no reason why these double-flowered forms should not grow here to be large and long-lived trees. The double-flowered Japanese Cherries bloom later than the trees with single flowers and in normal seasons just before or with the Lilacs; they remain in flower for several

days, and if they prove really successful when the proper stock is used on which to graft them the beauty and interest of the spring gardens of the United States will be greatly increased.

SYRINGA PUBESCENS. Attention is called again to this Lilac from northern China, for it is still too little known, although some persons who know it best consider that it is better worth a place in the garden than any other species or variety of Lilac. It is a native of northern China, and is a tall shrub with erect stems, small leaves, and broad clusters of pale-lilac colored flowers remarkable for the long tube of the corolla and for their delicate fragrance. For this fragrance, if for no other reason, this Lilac should find a place in every northern garden.

SOME AMERICAN HAWTHORNS. Among American Hawthorns are many species which are of exceptional value for the beauty of their abundant flowers, their bright-colored fruits and the brilliancy of their autumn foliage. A number of these plants are seen to advantage on the bank between the Shrub Collection and the Boston Parkway, and are best reached by the path leading to the right from just inside the Forest Hills gate. These plants were raised at the Arboretum from seed mostly planted between 1880 and 1885, and are therefore less than forty years old. None of these trees, however, have reached anything like their maximum size but are large enough to show their habit of growth and their character as garden ornaments. Hawthorns are usually long-lived plants and individuals a hundred years old are not uncommon; and, although it takes several years to produce a good Hawthorn collection, once established the plants will go on improving and last for a long time. Hawthorns are easily raised from seeds which require two years in which to germinate. Large specimens are easily transplanted, and all the species thrive in any well-drained soil. Growing naturally, the species are most abundant in those parts of the country where the soil is impregnated with lime, and they are therefore particularly suited to give beauty to the parks and gardens of a large part of the United States where the presence of lime and the character of the climate prevent the cultivation of several classes of plants



DIERVILLA FLORIDA VENUSTA
(FLOWERS DEEP PINK)
ARNOLD ARBORETUM

on which the gardeners of the coast region of the continent depend.

CRATAEGUS NITIDA. This is a native of the bottom-lands of the Mississippi River near East St. Louis where it sometimes grows thirty feet high and forms a tall straight trunk. The wide-spreading lower branches and the erect upper branches form a broad, rather open unsymmetrical head. The leaves are long and comparatively narrow and those near the ends of the branches are often deeply lobed; they are dark green and very lustrous, and turn yellow, orange or red late in October. The flowers are not more than three-quarters of an inch in diameter, and the scarlet oblong fruit rarely exceed the length of half an inch. The flowers and fruit, however, are produced in great profusion; and, although many species have larger flowers and handsomer fruits, the habit of this tree, its beautiful foliage and its autumn color make *C. nitida* one of the handsomest Thorn trees. Many persons indeed place it with the six or eight most beautiful species of the genus.

CRATAEGUS PRUINOSA. There is a good plant of this widely distributed eastern species on the bank. It is a small, round-topped tree with wide, dark blue-green, lobed leaves which late in the autumn turn dull orange or orange and red. The flowers are an inch in diameter in few-flowered clusters, and very conspicuous from the large, deep rose-colored anthers of the twenty stamens. The fruit, which is often nearly an inch in diameter, is nearly globose, bright blue-green covered with a glaucous bloom, and five-angled at the end of September; later it loses its angles, turns orange color and finally becomes dark purplish red and very lustrous. Both when it is in flower and when the fruit is red this is a very ornamental plant.

CRATAEGUS APRICA. There are two plants of this species in this collection. They are interesting as representing a peculiar group of the genus (*Flavae*) which is confined to the southeastern United States. *C. aprica* is a tree sometimes twenty feet high in the low valleys of the southern Appalachian Mountains which are its home. This plant is attractive when its many small leaves have turned bright orange and red.

and the branches are thickly covered with its small clusters of dull orange-red fruits. These plants were raised from seed presented to the Arboretum in 1876 by Asa Gray as *Crataegus coccinea*, the name by which most red-fruited American Hawthorns were known until the systematic study of the genus was undertaken some twenty years ago.

CRATAEGUS COCCINOIDES. There is a good plant of this Thorn in this collection. It is a round-topped densely branched tree with broad, thin, dark green, ovate, lobed leaves from two to three inches long which turn bright orange and scarlet. The large flowers are produced in very compact, nearly globose, from five-to seven-flowered clusters and are conspicuous from the large size of the deep rose-colored anthers of the twenty stamens. The fruit which is a good deal covered by the foliage, ripens, and falls gradually during the month of October, and is subglobose, nearly an inch in diameter, dark crimson, very lustrous and erect on short pedicels in compact clusters. This handsome plant is a native in the region of St. Louis. *C. punctata* is one of the largest and most widely and generally distributed of the species of the eastern states where it is often a tree thirty feet tall with wide-spreading branches which form a flat or round-topped head of great beauty. This species, which has been known for more than a century and is often cultivated, is peculiar in the fact that some individuals have flowers with rose-colored anthers and others have flowers with yellow anthers, and that the plants with the rose-colored anthers produce red fruit while those with yellow anthers produce yellow fruit.

ENKIANTHUS PERULATUS, or *japonicus* as it is perhaps better known, is unusually handsome this year, equalling and even surpassing the Highbush Blueberry (*Vaccinium corymbosum*) in the brilliant scarlet of its autumn leaves. Unlike *Enkianthus campanulata* it is shrubby in habit and forms a dense broad bush. The white bell-shaped flowers are attractive, but in the Arboretum the plants have not produced seeds, and this *Enkianthus* is therefore rare in American gardens. It is found, however, in all Japanese gardens where it is grown for its



FLOWERING CRAB-APPLE
MALUS FLORIBUNDA
ARNOLD ARBORETUM

autumn colors and where it is usually cut into dense balls. The best collection of *Enkianthus* is on the lower side of Azalea Path, where several species are flourishing.

EARLY-FLOWERING DIERVILLAS OR WEIGELAS. The earliest of these plants to flower in the Arboretum, and perhaps the handsomest of all the species, varieties and hybrids of *Diervilla* known in gardens, is the Korean form of *D. florida* discovered and introduced by Mr. Jack to which the varietal name *venusta* has been given. It is already a shrub here five feet tall and three or four feet through, and every spring is completely covered with dense clusters of rosy-pink flowers from an inch and a half to two inches in length. It is perfectly hardy, which cannot be said of all the garden Weigelas; it grows rapidly, and no shrub can bear larger crops of flowers.

DIERVILLA PRAECOX. This name has been given to an early-flowering plant which has been sent from Japan to Europe but is not a native of Japan and is not known in its wild state, although it is probably a form of *Diervilla florida* from northern China. In the hands of Lemoine, the French hybridizer, a number of beautiful hybrids or varieties have been produced and are now installed in the Shrub Collection. Among the handsomest of these are *Seduction* with red flowers, *Espérance* with pink flowers, *Avant Garde* with pale rose flowers, *Vestale* with white flowers, *Gracieux* with pink and white flowers, *Floreal* with rose-colored flowers, *Conquérant* with rose-colored flowers, and *Fleur de Mai* with pink flowers. These are less known but hardier and better garden plants here than many of the hybrid Weigelas more commonly cultivated.

PRUNUS TRILOBA. Among the flowers of early spring few are more lovely than those of this small Almond from northern China which, in spite of the fact that it has flowered in the Arboretum every Spring for the last twenty-years, is still very little known, although the form with double flowers (var. *plena*) is a common garden plant in this country and is often successfully forced under glass for winter bloom. The single-flowered plant should be better known. It is a tall shrub of rather open irregular habit of growth. The flowers, which are pure clear pink

in color, are produced every year in profusion, and among the shrubs introduced into cultivation by the Arboretum in the last thirty years none excel the single-flowered form of *P. triloba* in the beauty of their flowers. This shrub can be seen on the right-hand side of Forest Hills Road not far below the entrance. It can also be seen with *Prunus tomentosa* by the path leading from the Meadow Road through the woods into the Shrub Collection.

EARLY LILACS. The earliest Lilacs to bloom here, are the white-flowered *Syringa affinis*, and its variety with mauve-colored flowers (var. *Giraldii*), and *S. Meyeri*. *S. affinis* and its variety are tall shrubs of open habit and, except in their flowers, have no decorative value. The individual flowers are small but are borne in large loose clusters, and are exceedingly and pleasantly fragrant. *S. affinis* is not known as a wild plant, but is the common and perhaps the only Lilac cultivated in Peking, where it has been largely used in the Imperial and Mandarin gardens. The variety is a wild plant in the region southwest of Peking. *S. Meyeri* was found in a Chinese garden by the traveller whose name it bears, and is not known as a wild plant. As it grows in the Arboretum it is a shrub beginning to flower when not more than a foot high, and covering itself with small compact clusters of small dark purple very fragrant flowers. This interesting addition to the genus *Syringa* will probably never become a popular garden plant, although it may prove useful to the hybridizer.



THORN
CRATAEGUS COCCINIOIDES
ARNOLD ARBORETUM

*A Guide to the Literature of Pomology**

By E. A. Bunyard, F. L. S.



REVIEW of the literature of pomology within the scope of this paper necessitates certain limitations. Anything in the nature of a detailed survey will obviously be impossible, and the treatment of the subject must therefore be confined to a description of those books

which stand out as landmarks in pomological history, either by reason of their originality or by their value as a focus of the knowledge of their time. It is also necessary to fix a starting-point for this survey, and the question, "At what time did pomological literature commence?" is difficult to answer.

The Greek and Roman agricultural writers, to go no further back, wrote much that is of great interest in the history of fruit culture, and indeed it is impossible to appreciate the works of later writers without some knowledge of this literature. Their influence continued for many hundreds of years, and it was long before experiment enabled men to question their magistral authority.

It was not until the Renaissance that a real literature of pomology arose, a literature which was critical and founded upon personal experience. I will therefore take this period, which has the advantage of being conveniently vague, as my starting-point.

The first writer who deserves mention is Pietro de Crescenzi, or Crescentiis, who, though not strictly a pomological author, had a remarkable influence upon the horticulture

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of his time. Born at Bologna in 1230, he spent much of his life in travel and at an advanced age returned to Italy, where he wrote his *Opus Ruralium Commodorum* at invitation of Charles II., King of Sicily. This work was circulated in manuscript, and after the art of printing had become known in Europe it was printed at many different towns. It is said that a copy of this work was the first product of the presses of Louvain in 1474. Though written in the thirteenth century, it was not until the fifteenth century that its greatest influence was felt, and the numerous editions published all over Europe bear evidence of its great popularity. The chapters dealing with fruit cultivation are of much interest and show evidence of observation, only a few examples of which can be mentioned here. That strong-growing varieties of apples should be pruned in the summer is probably the first mention of summer pruning, and modern investigation is recalled by the advice to keep fresh-planted trees free from weeds until they are well rooted, after which it is not of such great importance. The storing of fruit in a dark place is recommended, and it is interesting to note the definite statement that no apples ripen in June or July.

After Crescentiis the next book of pomological interest is the very scarce work of Antonini Venuti *De Notensis Agricultura Opusculorum*, which was published at Naples in 1516. Nearly every kind of fruit has a chapter devoted to its cultivation and uses, very largely culled from Palladius and other Roman authors. It is, however, of the greatest interest, as being probably the first book published which deals exclusively with fruits.

About this time France became the leading country in the production of garden literature.

The sixteenth century was a happy period for the industrious compiler, and such men as Charles Estienne, brother of the famous printer, prepared many books based on writings of the ancients, mingled occasionally with original observations. His *Praedium Rusticum* was such a work, and deserves notice as the foundation of the more famous *Maison*

Rustique. Nothing of first-rate importance, however, appeared until 1600, when Olivier de Serres published his remarkable *Le Théâtre d'Agriculture*, a work which may truly be said to mark the departure from tradition and authority to the wider field of experiment and observation.

De Serres possessed in a large degree the "divine curiosity" which was so much a mark of the seventeenth century. At his home at Pradel, near Villeneuve, he founded what was probably the first experimental farm, and after a life spent in questioning Nature he employed his old age in setting down his experiences in garden and farm. His book is written in a charming style, and even nowadays is well worth reading, as its instructions in many garden operations can hardly be improved upon. The success of his book was instantaneous, and at the date of his death in 1619 it had already reached its eighth edition. His life has been written by Henry Vaschalde,* and his name is still honoured in France as the Father of French Agriculture. For pomologists his memory is kept alive by the late pear named after him by its raiser, M. Boisbunel, of Rouen. The value of the "Théâtre" is mainly cultural; some lists of fruits are given, but with few descriptions. We find, however, several fruits which are still grown, such as 'Bon Chétien d'Hiver,' 'Calliot Rosat,' among pears, and 'Court Pendu,' 'Passe pomme,' 'Blanc doux,' 'Châtaigner,' among apples, all of which may be found in French gardens to-day.

To gain any real idea of the fruits cultivated at this time it is necessary to turn to the remarkable catalogue prepared by Le Lectier. This industrious man was Procureur Royal at Orléans, and in his leisure moments a keen pomologist. In his garden he collected all the fruits of his time, and they numbered some 260 pears, 35 apples, and 27 peaches. By good fortune a unique copy of this catalogue has been preserved and is now at the Bibliothèque Nationale at Paris. This list of fruits has been reprinted by Leroy in his *Dictionnaire de Pomologie*, and is most valuable as a witness of

* *Olivier de Serres*, by Henry Vaschalde, Paris, 1886.

the great interest which must have been taken in fruit cultivation at this date.

The closing years of the sixteenth century mark the first appearance of a pomological literature in England. The earliest works were all translations or adaptations of French works. Leonard Mascall and Barnabe Googe were both translators, and it was not until William Lawson published his *A New Orchard and Garden* that we had a really English work. Authorities are not in agreement as to the date of the first edition, but the dates 1597 and 1615, given by Johnson in his *History of Gardening*, are probably erroneous. The earliest edition I have seen is in the British Museum, dated 1617. Another edition is dated 1618, and is probably a reprint of the first edition, and the second and third editions are respectively 1623 and 1626. Many other editions followed, and it was reprinted with Markham's *Way to get Wealth* in 1648.

The book is quite original and contains very practical directions for laying down orchards, and it is of great historical importance as the first really English work upon fruit trees.

No work of outstanding merit, from the point of view of this paper, was published in England till the translation of Quintinye's great work was undertaken by Evelyn. There are, however, two books which demand notice for the evidence they give of originality and research. The first of these is *The History of the Propagation and Improvement of Vegetables* by Robert Sharrock. The author was born at Adstock, in Buckinghamshire, and took the degree of D.L. at Oxford and afterwards entered the Church. He was led to write his book by his distrust of the fantastic tales of graftings and buddings described in many books of the time, tales which he not unfairly considers worthy of the great Sir John Mandeville. Finding by experiment how impossible it was to graft an apple on a cabbage or an elm, he thought well to describe the methods and limits of this practice. The work is not wholly confined to the propagation of fruits, but it cannot be omitted in the consideration of pomological literature. The first edition is dated 1660 and has 150 pages. The second edition was en-

larged to 255 pages and was published in 1672. The additions are general throughout, and do not consist of the adding of fresh chapters. The third edition (1694) was called *An Improvement to the Art of Gardening*, but is identical with the second.

Somewhat similar in scope was the work of Francis Drope, entitled *A Short and Sure Guide in the Practice of Raising and Ordering of Fruit Trees*, published at Oxford in 1672. A fellow of Magdalen College and a divine by profession, he took "an inoffensive delight" in planting, and this delight is evident on every page of this little book. The fullest directions for raising stocks and grafting trees are given in a style which is full of charm and quaintness. The grafting and budding of trees entirely occupy the writer, and the instructions throughout are of a very sound and practical order.

The next book which had a real influence upon English fruit gardening was Evelyn's translation of de la Quintinye's great classic, but before we consider this it will be well to return to French literature and its progress from the days of de Serres.

The seventeenth century marks the separation of horticultural from agricultural literature. With a few exceptions, such as the work of Venuti above mentioned, nearly all the works published before 1600 were of the *Maison Rustique* type, dealing with all the occupations of the country. After Olivier de Serres a real gardening literature began to spring up and give ample evidence of the interest which was being felt in the art. It was the age of formalism, and in the *Théâtre des Plans et Jardinages* of Claude Mollet (1652) we see the beginning of the style which was developed by Le Nôtre in later years, and which still remains the dominant influence in French gardens. The influence of such formalism was not without its effect in the fruit garden, and it was at this time that the espalier method of training came into great vogue. The author usually quoted as the first to deal with this form of training was Jacques Boyceau, author of *Traité de Jardinage selon les raisons de la Nature et de l'Art*. This is, however, a

mistake, as Olivier de Serres devotes a whole chapter to this subject, and speaks of it as an ancient practice, and its existence in the fifteenth century can be proved. There is no doubt, however, that at this time fruit trees were subjected to the most severe pruning in the rage for formal shapes, and they were often trimmed into the devices now associated with the yew and box.

But it was not long before a voice was raised against this unnatural practice, and the importance of this movement in fruit culture makes it necessary to give some prominence to Le Gendre, whose little work, *La Manière de Cultiver les Arbres Fruitiers*, was published at Paris in 1652. Much has been written on the subject of the authorship of this work. Some authorities consider the name of Le Gendre to be a pseudonym. Others allow Le Gendre the credit of writing rough notes which were worked up by others. Against these suggestions there are certain facts. That such a person as Le Gendre did exist is undoubted, and it is on record that he was born at Vaudreuil, in Evreux in 1612. He occupied the joint post of almoner and superintendent of the Royal Gardens under Louis XIII. His cure was at Henonville, in Normandy, and there he gathered together a collection of rare fruits, flowers, and animals. That he was a man of education seems evident from his friendship with Corneille, and this great poet has left verses commemorating the charm of the pastoral garden and its owner, one verse of which may be quoted here:—

Des arbres si beaux, l'épaisse chevelure
Conserve la fraîcheur d'une molle verdure,
Où divers animaux que je ne connais pas
Trouvent à se cacher et prendre leurs ébats.

Corneille, however, discloses himself as no gardener, for the *épaisse chevelure* was the very thing that Le Gendre set out to combat. It is his special merit that he realized that the pruning of fruit trees must aim at a natural and not an artificial form. The *chevelure* system of pruning with shears receives

his special condemnation, and he will have only the knife. Furthermore, he realized that different varieties, by their natural habit, demand different treatment in pruning.

This little book can hardly be valued too highly. Greatly superior to many works of numerous editions, it bears the imprint of the worker and observer, and conveys to the reader the real love of gardening more than any fruit book I can recall. His final counsels are admirable. "It would be useless to have examined with so much care the nature of fruit trees, to have given so many instructions for their right culture, if I did not finish by advice which I esteem the principal and most important of all; that one cannot have beautiful trees without loving them. Neither goodness of soil, nor rich manure, nor favourable situations will alone make them thrive, but it is the gardener's affection which makes them strong and vigorous."

A work which had a great popularity at this time was *Le Jardinier François*. The author, Nicholas de Bonnefonds, was, it is said, *valet de chambre* to the French King, but little more is known of him. The first edition of his work was published in Paris in 1651, and contains some very interesting early copper plates. The work covers all the operations of the fruit garden, and includes some interesting lists of fruits. Several editions rapidly followed, and in 1658 it was translated into English as *The French Gardener, Instructing How to Cultivate All Sorts of Fruit Trees and Herbs for the Garden*. The translation was stated in the first edition to be by "Philokepos" but Evelyn's name appeared in the second. Bound with this is generally found *Les Délices de la Campagne*, which follows the fruits into the kitchen and deals with their treatment there.

But the day for such homely works as these was passing, and the literature of fruit culture was coming to a stage when copious and magnificent volumes were published, works fully in keeping with the age whose King "had enough in him to make four kings and one honest man." Happily some part of this multiple personality was devoted to the development of the garden, and the final result, Versailles, has had a deep and lasting effect upon horticulture.

Almost equal in fame to the great Le Nôtre in the formal garden was La Quintinye in the "polager." Under his auspices this domestic quarter of the garden reached an importance hitherto unknown.

La Quintinye was born in Angoumois in 1626, and died in 1678. He studied at first for a legal career, but a journey to Italy turned his thoughts to gardening, and he was called on his return by Louis XIV to create the fruit and vegetable gardens at Chantilly, Rambouillet, and Versailles. For the royal table at Versailles every kind of fruit was wanted in perfection, and Quintinye supplied this both in and out of season, as forcing of fruits, vegetables, and flowers was largely carried on. His great work *Instruction pour les Jardins potagers et fruitiers* was published in 1690, two years after his death, and was the most detailed work at that time upon fruit trees and their culture. Every aspect was treated with great minuteness, and in fact some five hundred pages are occupied with fruits. Cultural information occupies the greater part of the work, and there are a few points upon which he shows evidence of originality. His disregard of the influence of the moon, so long an important factor in all garden operations, was remarkable; but a zealous and conservative editor, fearing that this innovation might not be well received, added a chapter which reinstated the moon to its hegemonic position. In the pruning of the roots when transplanting, Quintinye anticipated the moderns by insisting that all fibers and roots smaller than a quill are valueless and should be entirely removed, as new fibres must be produced before the plant could absorb water from the soil.

The descriptions of fruits given are not very full, but more so than those given by his predecessors, and a new feature was added by the very full notes of the cultural needs and special preferences of the various fruits. Another useful item is a definition of various gardening terms. In pruning Quintinye was a firm believer in the maxim, "First make your tree, then fruit it;" and his counsel, "Retarder vos jouissances pour en jouir plus longtemps," was applied both to pruning and

in his strong recommendation as to the need of thinning fruit. This later point was probably somewhat new in his day.

The fame of Quintinye and his work at Versailles was soon spread far, and he visited England, where he met John Evelyn, who later translated his book. It is not difficult to imagine the enthusiasm with which Evelyn would have welcomed the great French gardener, and the *Treatise on the Culture of Melons* which is added to the English translation was written at Evelyn's request. The success of the work was great; many French editions have been published, and it was also translated into Italian and Dutch.

Evelyn's translation was published in 1693 and entitled *The Compleat Gard'ner or directions for cultivating and right ordering of Fruit Gardens and Kitchen Gardens, with divers Reflections on several parts of Husbandry* (folio, London, 1693). It is a complete and literal translation. The great length of the work and the tedious repetition of some parts made an abridgment obviously desirable. This was provided by the famous nurserymen London and Wise, but was probably Evelyn's own work, and was entitled *The Complete Gardener, or Directions for Cultivating and right Ordering of Fruit Gardens and Kitchen Gardens*. Now compendiously abridged and made of more use, with very considerable improvements, by George London and Henry Wise. (London, 1699.)

This work had an instant success and passed through many editions with great rapidity, the seventh being dated 1719. It was through this work that the precepts of Quintinye became generally known in this country, and their influence was very great for many years.

The opening years of the eighteenth century in England were remarkable for an output of books on fruit trees, and there are many names from which it is difficult to select the most prominent. The dependence upon French authors had now ceased, a native literature was in full swing, and a certain revulsion from French influences may be noted.

The first author who claims notice is the Rev. John Laurence, who was born at St. Martin's, Stamford Baron, Northampton-

shire where his father was incumbent. After taking his degree at Cambridge he was presented with the living of Yelvertoft, Northampton. Subsequently he was appointed vicar of Bishopwearmouth, Durham, and finally he was a prebendary of Salisbury. These changes gave him a wider experience of soils and climates than falls to the lot of many writers, and he made full use of this experience in his books. His first publication was *The Clergyman's Recreation, Shewing the Pleasure and Profit of the Art of Gardening*, an octavo published at London in 1714. This passed rapidly into many editions, and was followed by *The Gentleman's Recreation*, London, 1716; *The Fruit Garden Kalendar*, London, 1718; and *The Art of Gardening Improved*, London, 1718; this last being a combination of previous works. A work called *A New System of Agriculture* (folio, London, 1727) contains some very useful chapters on fruit culture, and is of interest as presenting matured opinions.

Laurence was no mere theorist, and many of his practices were decidedly original. He was a great advocate of the bush system of cultivation, and his recommendations on planting are interesting. In planting a young tree all the roots were to be cut back to 6 inches and all fibres removed. Three main roots were considered sufficient. In planting no hole was dug; the root was just pressed into the soil and then covered with a fine mould. This method was said to prevent the production of coarse roots and to be very successful. His remarks on diseases are very interesting, and he says: "Had I but elbowroom, I have a great inclination to turn Quack in Vegetables." His counsels to nurserymen of the day were very sound, and doubtless much needed if we may judge by a letter sent to a disappointed purchaser by a "merry fellow" whose trees had not turned out all that might have been expected. It is impossible to refrain from quoting this ingenious epistle.

"It is true you gentlemen charge us (and often very justly) with sending you down bad trees and wrong sorts; but though you may think us Knaves, you must not say we are Fools,

for we have three *hits* for it. First, if the trees I send you down be a wrong sort or on a bad stock, the tree may die before it comes to bear, and then the fault is laid on the planter or other accidents and outward injuries, and so I hear no more of that, but another is sent for in its room, perhaps the same kind. Secondly, the Gentleman who sends for the tree may chance to die before it wins to bear, and then the next heir blames the choice and sends for another. Or, lastly, I die myself, and then the Proverb takes place, *De mortuis nil nisi bonum!*

The works of Laurence had a great popularity, but they were overshadowed by the excellent book of Stephen Switzer, whose *Practical Fruit Gardener* was published in 1724. In this the whole range of fruit culture is treated in a terse and clear style, and on every page it bears witness to a practical knowledge which was not too common in writers of those days. That Switzer had no great opinion of Quintinye's works is evident, and he speaks of his "round-about way" of conveying his opinions, but he is occasionally "oblidged" to admit that Quintinye was at times in the right.

Switzer was a nurseryman; his advice on stocks was therefore from first-hand experience, and it is curious to note in this matter how little things have changed since his day. His book must be given a very important place in British fruit literature, and some writers have even gone so far as to consider it the first book on fruit culture of any value.

The next work of importance is the *Pomona*; of Batty Langley. This is a folio volume; it was published in 1729, and is of interest as the first work in the English language which attempts to illustrate the different varieties of fruits. These illustrations are line drawings, but they certainly show a real appreciation of the characters of the fruits. The remarks on cultivation and descriptions of varieties do not present any special features, but the work was evidently popular, as it is frequently met with despite the adjective "rare," so often used in booksellers' catalogues. The author was born in 1696; he was an architect and garden designer, and published several books on this subject.

The remaining authors of the eighteenth century, such as Hitt, the prolific Abercrombie, and the voluble Forsyth, need not for our present purpose detain us. The details of culture had been well thrashed out by previous authors, and little room for innovations was left. The development of pomology henceforward was mainly in the systematic description, and in the raising of new varieties.

There is, however, one author, l'Abbé Schabol, whose work is at first a seeming contradiction to this statement, though in fact it is not so. His contribution consists in placing on record the remarkable system of peach training which had for long been practised by the gardeners of Montreuil. In the *Journal Économique* of 1775 this method was explained to the great confusion of the scientific, who found untutored peasants training their trees on scientifically correct principles. It was Schabol's good fortune to publish this method to the world, at first in the publication above-mentioned and afterwards in his *Dictionnaire des Jardiniers*, 1767, and his *La Pratique du Jardinage*, 1772. The latter work well repays study, as the instructions for pruning and the systems of training are described and figured with much detail, and several novel practices are there to be found.

It is necessary to return now to Continental writers to see the dawn of that greater exactitude in description which was to raise pomology to a branch of applied botany.

The introduction of a scientific method into pomological descriptions commences with Duhamel's famous *Traité des Arbres Fruitiers*, which was published in 1768. This versatile writer, an analogue of our John Evelyn, published an enormous number of practical books on commercial processes, from clay pipes to Turkey carpets. He was, however, a trained botanist, and with the help of some keen fruit-growers, Denainvilliers, Le Berriays, and others, he produced a book which set a new standard of accuracy. The discussion in the preface of the characters which are sufficiently constant to be available as recognition marks is extremely good. He also realized that all the tree characters must be included in any

accurate description. His illustrator was happily well supervised, and we therefore have fruits with their own leaves in true character, a feature rare in illustrations of fruits, where, for example, one leaf often serves for all the pears.

In the history of pomological literature, therefore, Duhamel stands prominent between the old and the new, and his influence may be traced in many of the books which followed. It will be convenient here to mention the many editions of his work, or rather of works to which his name was affixed. The first edition was the *Traité des Arbres Fruitiers*, as mentioned above, 2 vols., Paris, 1768. A new edition in 3 vols. 8vo. was published in Paris in 1782, and a pirated edition at Brussels in the same year. A coloured edition, extracted from the great *Traité des Arbres et Arbustes*, was then also prepared by Mirbel, Poiret, and other famous botanists. This also bears the old title, but is described as a "nouvelle édition" and is without date. It contains 150 plates from the designs of Redouté and Bessa. This may be called the first coloured edition. The second coloured edition was entitled *Nouveau Traité des Arbres Fruitiers*; it has 154 plates, and is edited by the same authors. As, however, neither of these editions is dated, it may be that their order should be reversed. The next edition (third coloured) was a sumptuous series of six volumes, containing 418 plates of great excellence. This was published by the house of Levrault, of Paris and Strasbourg, 1807-1835. It should be stated that the plates are numbered up to 329, but the total is made up by duplicated numbers. The last edition was practically a new work and is entitled *Pomologie Française*, edited by A. Poiteau, 4 vols. in folio, Paris, 1838-1846, 433 coloured plates.

These various editions of Duhamel's work have been dealt with at some length, as they are somewhat confusing at first, and furthermore they represent in the later editions the finest and most complete works than can be found upon this subject.

Among the remarkable French works of the eighteenth century, it is impossible to overlook the *Histoire Naturelle des Fraisiers* of Antoine Duchesne, which was published in 1766.

As a monograph treating garden varieties of fruits with botanical exactitude, this little work stands alone for its period. On the historical and cultural sides it is of no less interest, and in the history of strawberry literature it forms a starting-point of the utmost value.

In the nineteenth century the pomological literature of different countries entered upon more independent courses, and it will therefore be more convenient now to deal with each country separately, from 1800 to the present day.

LITERATURE OF THE NINETEENTH CENTURY

German, Austrian, and Hungarian Works

As the contributions of German authors have not yet been mentioned, it will be well to recall first the earlier works, *i.e.* those produced before 1800. In the Middle Ages, Germany was too much occupied in the rivalries of churches militant to give time for developing the peaceful arts. It is not surprising, therefore, that the pomological literature of those days is scanty, and it is not until the nineteenth century that such a literature really began. Rare books, of course, appeared from time to time, such as the *Oenographia* of Fr. Helbach, which was published in 1604, but the literature even of the eighteenth century was very largely based upon foreign authors. Such were, for instance, the *Neue Gartenlust* of Hesse, published in 1714, which was largely based on Merlet's *Abrégé des Bons Fruits*, and the *Baumgärtnerei* of 1763, adapted from Le Genfre.

The first native work of real importance is the *Pomona Franconica* of J. Mayer, published in three quarto volumes at Nürnberg, 1776–1801. The 253 coloured illustrations, though rather crude, are nevertheless very useful, and a French translation of the text is given in parallel columns. This work was doubtless published in a limited edition only, and is now extremely scarce in a complete state.

The year 1780 saw the publication of the first serious attempt at a classification of fruits. The author was H. L.

Manger, Inspector of Buildings to the Queen of Prussia. The book *Vollständige Anleitung zu einer systematischen Pomologie* is a folio of 192 pages, and contains two plates illustrating his classification by form. In the tabular arrangement, resembling that adopted later by Thompson in his *R. H. S. Catalogue of Fruits*, and in the historical notes, there is much of great interest. Manger was the first of the great school of systematic pomologists which gave Germany so prominent a place in the early part of the nineteenth century.

An Austrian pomology of importance was the *Pomona Austriaca* of Johann Kraft, published at Vienna in 1790-1796, 2 vols., with 200 fine coloured plates. This is a work of great value, especially for the South European varieties of fruits.

The opening years of the nineteenth century saw a remarkable expansion of a native literature, and the interest in fruit culture was greatly stimulated by the works of Christ, Diel, and Dittrich. The first named, Christ, was a country parson, and his works were mostly of a popular nature and did much to encourage the farmer and small gardener to take up the cultivation of fruit. It may be said here that, though such works are not of importance in this survey of pomological literature, they are of the greatest value, and no reproach is intended in the use of the word popular in this connexion. It is the small books which have done most to create an interest in fruit culture, as they have reached the gardener directly. Christ's two works which bring him into the scope of this article are the *Pomologisch-praktisches Handwörterbuch* and the *Vollständige Pomologie*. The first is a stout quarto of 431 pages and is arranged in dictionary form, giving descriptions of fruits and explanations of all the terms used in fruit culture. It was translated into Flemish by Serrurier. The *Vollständige Pomologie* was published in two volumes at Frankfort in 1809-13, the first dealing with pomaceous fruits, the second with stone and bush fruits. This was a systematic work, giving full descriptions of varieties, and is still of great value.

Frederick A. A. Diel was a fashionable physician at Ems, but his spare time and his years of retirement were devoted to pomology. His publications were almost entirely systematic, and they form a most valuable record of the varieties of the day. Diel was fortunately also a grower of fruits on a large scale, and his nursery was of considerable extent. His most important book was entitled *Versuch einer systematischen Beschreibung in Deutschland vorhandener Kernobstsorten*, 24 8vo. volumes, Frankfort, 1799-1825. It consists entirely of descriptions of fruits. Synonyms and references to literature are given, and tree characters are noted. This work is one of the classics of pomological literature, and occupies a place therein almost of equal importance to the *Species Plantarum* in botanical literature. A useful index was published by H. Meyer in 1834. The famous classification of fruits was published in the first volume, and it is upon this that Lucas built the system used in Germany at the present time.

Diel's work had only three coloured illustrations, and the need was felt for a book which should illustrate the varieties he had described. This was supplied by Baron von Aehrenthal, who published about 1837 the first volume of *Deutschlands Kernobstsorten*. (Three quarto volumes, Leitmeritz, 1833-1842?) This contains ninety-eight coloured plates, each illustrating four fruits. He describes the fruit and the tree in a concise manner. Publication was discontinued after the death of the editor. This is a scarce work, rarely found in libraries, but a copy exists in the British Museum.

The year 1819 was notable for the remarkable monograph on the cherry by Truchsess, entitled *Systematische Classification und Beschreibung der Kirschensorten*, von Christian Freiherr von Truchsess. This stout octavo volume of some 700 pages describes with great detail some hundreds of varieties.

The *Systematisches Handbuch der Obstkunde* of Dittrich was published in 1837, and consists of three octavo volumes, each over 600 pages. This is a purely descriptive work and is of some importance, though not equal to that of Diel.

A finely illustrated work based on Dittrich's book was pub-

lished later, entitled *Deutsches Obstcabinet in naturgetreuen fein-colorirten Abbildungen zu Dittrichs systematischem Handbuch* (4to., Jena, 1855-6-7-8). This is a very valuable book. The plates are a little rough, but are all well drawn. Apples are shown in section as well as the whole fruit. The core is generally drawn separately, as are the seeds. In the section dealing with peaches, leaves and flowers are added. A notable feature is the excellent series of cherries and nuts, the latter having nowhere—as far as I have found—been so well illustrated in colour. The text is occupied only with references to the plates, and does not supplant Dittrich's own descriptions.

There is some difficulty as to the different editions of this work. The first is probably dated 1853-60, but as I have never seen this I quote above from the edition in my possession, which is probably the second.

There are two other systematic pomologists whose works were published about this time who deserve mention. The first is F. W. Hinkert, Principal of the Pomological School of Weyhenstephan. His work consists of three octavo volumes and was entitled *Systematischgeordnetes Handbuch der Pomologie* (Munich, 1836). It describes all hardy fruits in a clear manner, and is a work which, if not indispensable, is a desirable occupant of a pomologist's library.

Dochnahl's work, *Der sichere Führer in der Obstkunde*, was published in four small octavo volumes. The first (1855) describes 1263 apples; the second (1856) 1050 pears; the third (1858) is devoted to stone fruits, and the last (1860) to nuts and small fruits. By a careful system of abbreviation an enormous amount of information was compressed into these small volumes, each of which can be put into the pocket. A great feature is the careful synonymy, which forms a valuable guide to other literature. All fruits are classified, and in some cases the system is original. The descriptions are of necessity somewhat brief, but the work as a whole is invaluable for reference.

In 1859 the publication of the classical *Illustriertes Hand-*

buch der Obstkunde was begun under the joint editorship of Jahn, Lucas, and Oberdieck. This work contains without doubt more descriptions of fruits than can be found in any other publication. It consists of eight volumes. A general index was published with the eighth volume in 1875. The plan of the work is to give an outline drawing of each fruit with a full description; and while the earlier volumes deal with one kind of fruit only, *e.g.*, vol. i., apples, vol. ii., pears, later issues take all fruits so as to bring it up to date. It would be difficult to overrate the importance of this work in the history of German fruit culture, both for its value as the standard work of reference for the old varieties and for the publication of accurate descriptions of the new ones. Three supplementary volumes must be added to the nine mentioned above: a list of additions and corrections, *Zusätze und Berichtigungen zu Bänden i. und iv.*, by J. Oberdieck 1868, a supplementary volume on pears by Lucas and Oberdieck, published in 1879, and one edited by Lauche, published in 1883 including the more modern varieties.

Of quite recent works there are a few well worthy of inclusion, and among the most important stands *Deutschlands Apfelsorten* by Dr. Th. Engelbrecht (Braunschweig, 1889, 8vo.). This work, as the title indicates, is entirely devoted to apples, and no fewer than 688 varieties are described, each being illustrated by an outline figure. The arrangement follows the Diel-Lucas system of classification. The fruit alone is described, but very fully, and certain details, such as the pistil characters, are not to be found in other works. References to literature are also given. The varieties described are naturally mostly of German origin, but a large number of the fruits are those of other countries.

A good work, with coloured plates, is the *Aepfel und Birnen* of Goethe, Degenkolb, and Mertens, an octavo volume published at Berlin in 1894. This describes briefly a selected list of 53 apples and 51 pears. A coloured plate of moderate merit is given of each sort. The work is useful for certain of the newer German varieties not figured elsewhere.

Of modern German works none better can be selected than *Deutsche Pomologie* by W. Lauche. This consists of six volumes, of which two are devoted to the apple, two to the pear, one to cherries and plums, and to apricots, peaches one and grapes. The lithographed figures are very well produced, the colours being exact. A leaf and a flower are generally included. The whole plant is described, and references are given to history and literature.

Maurer's *Stachelbeerbuch, über die besten und verbreitetsten Stachelveersorten* (zusammengestellt von Louis Mauer, Stuttgart, 1913) is without doubt the finest monograph on the gooseberry that has yet appeared. One hundred and fifty-eight varieties are described and photographed, and fourteen coloured plates are added. The descriptions are the most detailed and the name of Maurer is enough to ensure that they are the result of long and careful study. Very valuable are the preliminary notes on the constant characters used in description.

It will be noticed that all the works so far mentioned are systematic and not cultural. Of the latter so many are produced that it is difficult to select any one as a typical example. In Germany, however, the works of Gaucher have long been accorded a premier place for instructions on pruning, training, etc., and it will therefore be necessary only to refer to these.

The most elaborate is the *Handbuch der Obstkultur* by Nicholas Gaucher, one portrait, 625 woodcuts, and 16 tables. This colossal work has already run into four editions, and for detailed instructions as to training trees it is probably unique.

A smaller work dealing with less detail on cultural matters is the *Obstbaukunde* by the same author, with 211 woodcuts (Berlin, 1912, 2nd edition). It provides ample information for the average gardener, and can be thoroughly recommended.

A recent work of Carl Mathieu, entitled *Nomenclator Pomologicus, Verzeichnis der im Handel und in Kultur befindlichen Obstarten, mit ihren Synonymen oder Doppelnamen* (Berlin, 1889), gives, as the title indicates, a list of names and

synonyms with references to literature, and serves therefore as an index to pomological literature. It is of the greatest value in hunting up varieties, or as a record of names already applied, and is the most complete work of its sort yet attempted.

There are a few periodical publications which cannot be overlooked, and the most important of these are the *Pomologische Monatshefte*. This valuable work was first published in 1855, under the editorship of Oberdieck and Eduard Lucas, as the *Monatsschrift für Pomologie und praktischen Obstbau*. It is continued at the present day as the *Deutsche Obstbauseitung* and is the organ of the Deutsche Pomologen Verein at Eisenach. This is an extremely valuable publication, and represents a complete history of German pomology for 57 years. The coloured plates are of moderate excellence, and the articles are written by the best experts of the time. It is at present, as far as I know, the only real pomological journal published where new varieties are described and figured.

An older work of value is *Der Deutsche Obstgärtner* of J. V. Sickler. This consists of 22 octavo volumes, and was first published in 1794. The illustrations are rather crude, but valuable for their date, and some interesting historical articles by Sickler himself give the work a special value. The portraits of contemporary pomologists are another interesting feature.

Another publication worthy of mention is the *Zeitschrift für Obst-und Gartenbau*, published by the Pomological Society of Saxony at Dresden, 1875-1908. This was called for the first three years the *Sächsische Obstbauseitung*.

The most important Pomology now being published is the *Deutschlands Obstsorten* edited by Muller, Grau, and Bissmann. This was begun in 1905, and three fascicles are published each year (except in 1912 and 1913, when six parts were issued in each year). Each part describes four varieties of fruits, with a special full-sized coloured plate. A very important and new feature is a photograph of each variety

in the winter state, showing very clearly the different types of growth. The fruit only is described in detail, but full particulars are given as to the habit and preferences of the tree, and a useful summary of bad characters. This work when complete, will form a most valuable addition, and worthily ends this review of German literature.

French Works

The nineteenth century in France was remarkable for an output of works on fruits of a variety and excellence which have never been surpassed. The works of Duhamel have been mentioned above and need not be referred to further. There were, however, many other authors in the last half of the century producing works of great excellence, if not so elaborate a character.

The first of them was *Le Jardin Fruitier* of Noisette (3 vols., 4to., Paris, 1821). Noisette was a well-known nurseryman, and his name is still commemorated by a class of rose named after him. The first volume deals with cultivation; the second describes the fruits; and the third is composed of coloured plates. These, though not of first-class merit, are nevertheless quite good and are evidently drawn by a pomologist. A second edition of this popular work was published in 1839, 2 vols., 8vo. The plates in this edition are by P. Bessa, artist at the Museum of Natural History at Paris, and are coloured lithographs of merit. The second edition is therefore preferable for the plates and figures of many additional varieties.

The lavish expenditure of the Second Empire was not without its benefits to fruit literature, as to imperial generosity we owe the magnificent *Jardin Fruitier du Muséum*. The author Joseph Decaisne, was Director of the Museum, now the Jardin des Plantes, and was a student under Adrien de Jussieu. His training as a botanist was of great value, and his first works were all of descriptive and economic botany. The first volume of his work was published in 1858, and it was completed by the eighth volume, published in 1873. Of the

colouring of the plates it is impossible to speak too highly; the lithographs are magnificent, and no pomological work has ever approached them for correctness of colouring. The drawing is of equal merit, and the wood and leaves of each fruit shown are indicated in outline with the greatest exactitude. The work deals mainly with pears, and vol. i, contains an elaborate monograph on the species from which the garden varieties have been derived. Peaches, a few plums and strawberries are figured, the last being described by Madame Vilmorin. It is a matter for regret that this splendid work had to be discontinued before the apples were undertaken, as, if complete, it would stand without a rival.

The next important work was the *Pomologie Générale de France*, published at Lyon by the Congrès Pomologique de France. This excellent work consists of 8 vols., large 8vo. (1863-1871), with coloured plates of each fruit. Only such fruits as were admitted by the Congress as of merit were included. The question of synonyms was fully dealt with, and the descriptions are most full and reliable. The fruit, leaves, shoots, and fruit buds are illustrated, and all kinds of fruits are included. The work as a whole forms a most valuable guide to French fruits, and is quite indispensable.

In 1865 a useful descriptive work was published by M. P. de Mortillet, a nurseryman of Grenoble, the first volume dealing with peaches. The second appeared in 1866 and described cherries, and the third in 1868 is upon pears. The title is *Les Meilleurs Fruits par Ordre de Maturité et par Série de Mérite* (Grenoble, 1865-68). A curious feature is that much of the information is given in the question and answer form, a young man, Léon, providing the questions and the author the answers. This work is valuable, and the descriptions and outline drawings of fruits by the author alike give evidence of first-hand observation. Of special note is the treatment of the cherries, for which Grenoble has long been famous. The volume on pears is occupied largely with cultural matter, those described being a delected list.

Good as this work was, it was overshadowed by the masterly

Dictionnaire de Pomologie of André Leroy, of which the publication was begun in 1867 and continued until 1879. Up to this time no such work had been published, and its treatment of certain points, such as, for example, historical references, make it even today a mine of information not to be found elsewhere. The descriptions of the fruits are not quite so full as those of the *Pomologie de la France* above referred to, but they are precise and generally sufficient. Outline drawings are given of each fruit, and often, where the variety is variable, two typical forms. Some idea of the extent of the work will be given by the following figures of fruits described; Pears, 915; apples, 525; peaches, 124; apricots, 43; cherries, 127. A volume on plums was in preparation, but the author's death prevented its publication. A very valuable feature is a reference under each variety to the authors who have previously described it. It is therefore possible to see at once the history of the fruit and to refer to the first record of the name. Another feature of great value is the addition of an historical sketch of each kind of fruit, showing in a most interesting manner the development, for instance, of the pear from Roman times to the present day. We may perhaps demur to a tendency to identify certain of our oldest fruits with those of Roman authors, as this, owing to the vague descriptions of those days, must be largely a matter of guesswork. These details and the elaborate and critical histories of each variety are the remarkable features of this invaluable work. A useful bibliography is to be found in the last volume.

The last of the great French systematic school was Alphonse Mas, who was born at Lyon in 1817. His life was entirely devoted to the study of fruit, and his garden at Bourg contained probably one of the finest collections of fruits ever gathered together in one place. His first book was *Le Verger, ou Histoire, Culture et Description des Variétés de Fruits le plus généralement connus* (8 vols., 8vo., Paris, Masson, no date probably 1865-1874). It is entirely descriptive, and coloured plates are given of each fruit. These plates are of fair merit,

the fruit alone being depicted. The great value of this work, however, lies in the remarkable descriptions. Wood, flowers, and leaves are all described with the greatest precision. Mas had a skill approaching genius for finding the happy word in this matter, and his remarks on the character of the tree as a whole are wonderfully suggestive. References are given to previous descriptions and to synonyms, but the historical notes are few and curt. A combination of this work and of the *Dictionnaire* of Leroy would make an ideal pomology. All hardy fruits are described except bush fruits, raspberries and strawberries. This work was, however, a selection of the best fruits, and the records of other fruits of less importance were published in his *Pomologie Générale* (1872-1883, 12 vols., 8vo.). In these volumes the fruits are discussed in the same detail as in *Le Verger*, but the illustrations are outline drawings. As an indication of the extent of the work it may be stated that 581 pears, 253 apples, 147 plums, 71 cherries, and 22 peaches are all fully described. These two works of Mas are quite indispensable in any pomological library.

The last two descriptive works of importance which it is necessary to notice are published by the National Horticultural Society of France and by the Pomological Society, whose headquarters are at Lyon. The first named published its work under the following title:—*Les Meilleurs Fruits au Début du XX^me Siècle: Histoire, Description, Origine et Synonymes de 250 Variétés Fruitières recommandées* (Paris, large 8vo., no date—about 1907). Each fruit is shortly described and illustrated with line drawings of great excellence. All hardy fruits are described, and cultural notes are included for each kind. This work is especially useful as a selection of the most worthy fruits. It is not sold, but presented to members of the Society.

The work of the Lyon Society is on similar lines and is entitled *Catalogue Descriptif des Fruits adoptés par le Congrès Pomologique*, Lyon, 8vo. 1887, Suppl. 1896. It is entirely descriptive, and each fruit is illustrated by an outline draw-

ing. The descriptions are not very full, and tree characters are scantily described. This work is useful for its records of some of the newer fruits, but it is not so good as the production of the Paris Society.

A useful work was published in 1876 by the well-known nurserymen Simon Louis Frères, of Metz, entitled *Guide Pratique de l'Amateur de Fruits*. A very large number of fruits are briefly described, and while these descriptions consist only of a few lines, they are useful for the amateur. At the end of the work is an index, with an extensive list of synonyms, and this part is the most valuable feature of the work. A second and enlarged edition appeared in 1895.

It is necessary now to mention a few works on cultivation which have not been included in the above list. The French gardeners have always been famous for the refinement of training and grafting, and very many works have appeared on this subject. An author who had a great vogue in the middle of the last century was A. Du Breuil. His best known works, *Instruction élémentaire sur la Conduite des Arbres Fruitières* (1854) and *Cours élémentaire Théorique et Pratique d'Arboriculture* (5th edition, 1865), represent in an able manner the knowledge and opinions of his time upon all cultural matters.

A very interesting little work on grafting was published about 1868 by A. Thouin, then Professor at the *Muséum d'Histoire Naturelle* at Paris. The title is *Monographie des Greffes, ou Description technique des diverses sortes des Greffes employées pour la Multiplication des Végétaux* (Paris, 8vo., 8 plates). There are a remarkable number of different methods here described and figured.

A very practical work, less detailed than that of Du Breuil was written by Gressent and entitled *L'Arboriculture Fruitière* (Paris, 1862). It is a very good general treatise, which does not enter too fully into the more elaborate details of training and grafting.

In more recent times Charles Baltet's books have had a large circulation. His *L'Art de Greffer* still stands as the best exposition of grafting in all its branches; an English

translation was published in 1873, and other editions have since appeared. His other most successful work, *Traité de la Culture Fruitière commerciale et bourgeoise* indicates its scope sufficiently by its title, and has reached many editions.

Of quite modern works there is nothing, for clearness and brevity, to equal *L'Arboriculture Fruitière en Images* by J. Vercier (Paris, 8vo., 101 plates). This work stands quite alone in giving a complete pictorial guide to the pruning and training of trees, an excellent feature being a drawing showing the pruning to be made and the result on the same page. This book can be highly recommended to all who wish to increase their knowledge of pruning and training fruit trees.

Periodical Literature.—There is not much to be recorded under this heading, though the proceedings of many horticultural societies in France contain many interesting papers and first records of new varieties. The only important periodical entirely devoted to pomology is the *Journal of the Société Pomologique de France*, entitled *Pomologie Française*. This was first published in 1872, and appears monthly. The *Revue Horticole*, begun in 1829, still continues a flourishing course, and contains many excellent articles and coloured plates of fruits.

The Journal of the Société Nationale d'Horticulture de France contains some good articles in its earlier issues, but in recent years original contributions have become less frequent.

[NOTE.—No attempt has been made to refer in the above to the literature of the Vine, both on account of its extent and for its lack of interest to British gardeners.]

English Works

The opening years of the nineteenth century were the Golden Age of Pomology in this country. The extraordinary expansion of commerce and the great prosperity it brought had an enormous influence upon horticulture and upon its literature. The remarkable output of books, many illustrated in an elaborate and costly manner, is evidence not only of a great gardening interest, but also of the means to encourage it. By a happy chance this period coincided with

the appearance of several men whose names will always be prominent in pomological history. Thomas Andrew Knight, Thompson, Lindley, Ronalds, Hooker, and Brookshaw, all produced their best work between 1800 and 1837, and during that period systematic pomology was established in this country.

The first of the group is Thomas Andrew Knight. This gifted man, whose connexion with our Society is too well known to need repetition, was happy in possessing an enthusiasm for horticulture together with the leisure to indulge it. His work shows, unfortunately, the defects of his qualities. His descriptions of fruits are very slight, and some of his theories did not long survive him. Nevertheless, as a fruit breeder and fancier, his work was of the greatest importance. His principal book is the *Pomona Herefordiensis* (London, 4to., 1811). This was designed to depict the old cider and perry fruits of Herefordshire, and the plates are extremely good, being prepared by that great fruit-painter William Hooker. In the preface the author describes his method of cross-fertilizing, which seemed to be unknown in England at that time in so far as fruit-breeding was concerned. The work of Miller had evidently been forgotten or overlooked. The remarks accompanying the plates have reference chiefly to the cider or perry qualities of the fruits. A smaller cultural work was published by Knight in 1797, *A Treatise on the Culture of the Apple and Pear*, a second edition in 1802, a third in 1808 and 1809, and the fourth in 1813. In this work the author states his famous theory of degeneration or "running out" of fruit, which is now disproved. A number of very valuable papers were contributed by him to the early volumes of the *Transactions* of this Society and these are well worthy of study.

The next author who merits attention is George Brookshaw, who has the distinction of having published the largest work in size and the heaviest (on the scales) in English pomological literature. This is the *Pomona Brittannica* (London, 1812), atlas folio, plates. It is an entirely descriptive

work, and the text, though not giving the information needed by modern standards, is nevertheless good, and the plates are for the most part quite excellent. Especially may be noted the cherries and pine-apples. It is of great value as a record of the varieties of the day, many of which were grown at the Royal Palace of Kensington. Brookshaw's second work bore the same title, but was a quarto in two volumes, with ninety plates, and is a popular edition of the larger work. The plates are also very well prepared, and the date of publication is 1817. His last work was called *The Horticultural Repository, containing the best varieties of the different Species of English Fruits*. (London, 1823, 8vo.) The coloured plates in this work are extremely coarse, and the work is quite a worthless production. Copies were also issued with plain plates.

In the year 1818 was published the *Pomona Londinensis* of William Hooker. The title-page runs: "*Pomona Londinensis*, containing the coloured Representations of the best Fruit cultivated in British Gardens. With Descriptions, in which the author is assisted by the President and Members of the Horticultural Society" (London, 4to., 1 vol., 49 plates 1818). This work contains some of the best coloured plates that have been published. The skill of Hooker as a painter of fruits has never been equalled in this country, and here he is at his best. The descriptions of the fruits are good, and contain some interesting historical matter. It is to be regretted that this valuable publication was discontinued after seven parts only had been issued.

In 1826 the first edition of the *Catalogue of the Fruits cultivated in the Garden of the Horticultural Society of London* was issued. This was largely the work of Robert Thompson, fruit expert to the Society, and, I venture to think, the greatest English pomologist. The book was prepared to revise nomenclature and to settle the question of synonyms. That it was no mere desk work is evidenced by the volumes of notes and drawings in the Society's possession, in which the names and varieties are discussed by Turner, Lindley, and

above all Thompson, with the greatest detail. The arrangement of this catalogue is tabular, and the descriptions are of the vaguest, and in no way represent the enormous work which had been done before the true name of the variety had been settled. A second edition was published in 1831, and a third in 1842.

An important work with coloured plates was *The Pomological Magazine, or Figures and Descriptions of the most important Varieties of Fruits cultivated in Great Britain*, by John Lindley (3 vols. 8vo., 1827-30). This was afterwards reprinted as *Pomologia Britannica* in 3 vols. (1841). Though ostensibly by Lindley, the work was mainly due to Robert Thompson. The descriptions are not all of equal value, but most of them are very full, the wood and leaf being described as well as the fruit. The plates are good, and usually show a young shoot and leaf. The whole book gives evidence of careful observation and testing of varieties.

The year 1831 was notable for two works of importance in British pomological literature. The first of these is *A Guide to the Orchard and Kitchen Garden*, by George Lindley, edited by John Lindley, London, 1831, 8vo. The author was a nurseryman near Norwich, and the father of John Lindley, Secretary to the Horticultural Society. He had been collecting material for this work for some forty years, and the result is a book of the greatest value. The descriptions of the fruit are fairly detailed, and the general notes upon each variety are most useful. A special feature is the record of many East Anglian varieties which are here described for the first time. The historical notes are a mine of information as to English varieties, and the dates of introduction of foreign sorts. Lindley's work has never been valued quite at its full worth, though it is without doubt one of the really important English books on pomology.

The next publication which rendered the year 1831 specially notable was the work of Hugh Ronalds entitled *Pyrus Malus brentfordiensis, or a Concise Description of Selected Apples* (London, 1831, 1 vol., 90 pp. 42 coloured plates. The great impor-

tance of this work lies in its magnificent coloured plates of English apples. There is no work which has depicted so well and fully the native varieties of this country. The descriptions are short, and not very systematic, but too high praise cannot be given to the coloured drawings. These were done by Miss Ronalds under her father's direction, and I know of no work where the essential points of difference have so well been brought out, or the colours and textures better suggested. Ronalds was a nurseryman at Brentford; his knowledge of apples was gained from a lifelong experience, and his book is a worthy memorial to his labours.

After this book there was a long period in which no words of the first importance were issued, and it was not until the publication of the *Herefordshire Pomona*, of Hogg and Bull that a really comprehensive work on fruits appeared.

There is one author whose work, though not of great importance, still merits mention, and this is John Rogers, the author of *The Fruit Cultivator*, the first edition of which was published in 1834, and the second and third editions in 1835 and 1837. This little work bears all the marks of originality, and the author's racy personality is frequently in evidence. Both cultural and descriptive matter are included, and many interesting scraps of history are here to be found. It is an entirely human book, which even the most hardened systematist will benefit by including on his shelves. Rogers was in his eighty-fourth year when he wrote this, and his opinions and counsels may therefore be considered mature.

In the year 1851 was published the first book by Robert Hogg, the pomologist, who for so many years stood high above his contemporaries in this country. This was entitled *The Apple and its Varieties, being a History and Description of the Varieties of Apples cultivated in the Gardens and Orchards of Great Britain* (London, 8vo., 1851; second edition, 1859). This was the first volume of a projected British pomology, a work which was not completed on the lines of this volume, but on the more restricted scale of the *Fruit Manual*. This work is arranged alphabetically, describes all the more worthy varieties, and

gives outline drawings of seventy fruits. A good feature is the reference to a first authority for the name of each fruit, and also to previous literature and coloured plates. A classification based on the season is introduced, but this was dropped by Hogg in later works for his later system of eye and core characters. This work is extremely useful, and one can only regret that it was not followed by further volumes dealing with other fruits in the same manner. In 1860 the first edition of the famous *Fruit Manual*, appeared, a small 8vo. volume of very different appearance from the stout fifth edition. The descriptions are very short, but all hardy fruits are treated. Other editions rapidly followed, the second in 1862, the third in 1866, and the fourth in 1875, which was in size a near approach to the fifth and last edition of 1884. This work is so well known that any detailed description is unnecessary. Judged by the highest standards, however, it cannot be considered a completely satisfactory production. Such descriptive works should belong to one of two categories: the popular work in simple language for the amateur or the detailed technical work for the expert. *The Fruit Manual* falls between these two. Too detailed and technical for the average amateur, it is not systematic enough to pass into the highest standard. Hogg was too much inclined to treat his fruits as museum specimens. His references to the tree are few indeed, and many things go to show that his study of the fruit commenced with its arrival in the fruit room rather than with its development on the tree. A small point in confirmation may be quoted. In describing the stems of apples he often refers to a "nobbed" stem or to an "extraordinarily thick and fleshy" one. This character is constant in certain apples, but by no means in all the varieties in which he describes it. A closer acquaintance with the tree itself would have shown that, when the central or "king" blossom of a truss is set, the stem is always much more stout and fleshy and the basin shallower than in those cases where a flower from the side of a truss is set, in which case the stem is always longer. Another fatal error was that Hogg sometimes made his descriptions from a single fruit sent him by a corre-

spondent. This, it is hardly necessary to say, is against all the rules of accurate description, and the fact that he did not realize it throws a doubt on all his work. Another criticism must be passed on his lack of system in description. A character will be mentioned in one fruit and omitted in the next. It is evident also that some of the fruits he included had never been seen by him, as certain descriptions are borrowed without acknowledgment from other writers. Notwithstanding these faults, there is much to be thankful for in the *Fruit Manual*, and an especially good feature is the careful historical notes after each variety. Hogg gathered together a huge amount of information, and stands out as the greatest pomologist of his time. One can only regret that a little more care and system were not applied, for they would have made the *Fruit Manual* worthy to stand by the best systematic works of any country.

The most recent pomological work of any extent is the *Herefordshire Pomona*. This was edited by Dr. Hogg and Dr. Henry Graves Bull, and published in 1876-1885 (3 vols, 4to.). The text is by Dr. Hogg, and is taken practically word for word from the *Fruit Manual*. The introductory chapters upon the history and lore of the apple are by Dr. Bull and are of much interest, especially such parts as relate to the West Country. The coloured plates are very good. A considerable number of fruits is shown on each plate, generally without foliage. This book is valuable for its records of more modern fruits which are not elsewhere figured.

This list comprises all the most important descriptive works published in this country. Of cultural works there has never been so great an output as, for instance, in France. Of the older writers no one put matters more clearly than Robert Thompson in his *Gardener's Assistant*, and even to-day his directions in the first edition (1859) can hardly be improved. Modern cultural works will be found in the Appendix to this paper.

Periodical Literature.—The most important item in this division is the *Transactions of the Royal Horticultural Society*, which

were started in 1815. The fine quarto volumes have many articles of great value, and many excellent coloured plates of fruits. The earlier volumes were largely devoted to vegetables and fruits, and in these are many papers from T. A. Knight.

Any detailed reference to important papers is, of course, not possible here, but the work of George Lindley on Peaches, vol. 5, and the valuable monographs by James Barnet on the Strawberry, vol. 6, and of Robert Thompson upon Apricots, Cherries, and Gooseberries in vol. 1, second series, are well worthy of study.

There has been no strictly pomological publication in this country, and of the general gardening papers the best for illustrations and descriptions is the *Florist and Pomologist* (1862-1884), which contains valuable figures of fruits of fairly recent times not elsewhere to be found. It is not necessary to refer to the many excellent gardening papers which exist at the present day, as they are well known.

American Works

The history of American Pomology can be traced back to the early days after the arrival of the "Mayflower," and there is plenty of evidence that one of the first occupations of the settlers was the production of fruits. It was, however, many years before a native literature appeared, and the first work which comes within the scope of this paper was not published until the nineteenth century. This is the well-known work of William Coxe: *A View of the Cultivation of Fruit Trees and the Management of Orchards and Cider* . . . (Philadelphia, 8vo., 1817). This book is of great importance in many ways, but most of all for its early records of native varieties. The custom of raising fruits from seed, owing to the difficulties of distribution, has resulted in an enormous number of local varieties, which as communication improved, began to spread their fame. The uncertainties of nomenclature may be imagined, and it was Coxe who first tackled this very difficult question. The work is largely descriptive, and many of the fruits are illustrated by coarse woodcuts. His descriptions are fairly

complete, and the historical notes which are sometimes appended are most valuable. Coxe was an observer, and his work gives evidence of original work in many directions and may be considered the foundation of American pomological literature.

The next published work was *The American Orchardist* of Dr. James Thacher, Boston, 1822. It is mainly cultural and largely adopted from other authors, and need not therefore be described in detail.

From this date onwards many books were published, and some, such as *The New American Orchardist* of William Kenrick, and the *Pomological Manual* of William Prince, had much success.

In 1833 a reprint of Lindley's *Guide to the Orchard* was edited by Michael Floy and adapted for American readers. In 1845 was published the famous work of A. J. Downing, which has taken from that time until the present day a most important position in America. The title will indicate its scope: *The Fruits and Fruit Trees of America, or the Culture, Propagation, and Management, in the Garden and Orchard, of Fruit Trees generally, with Descriptions of all the finest Varieties of Fruits, Native and Foreign, cultivated in this Country*, roy. 8vo., 1 vol., New York, 1845). Downing was a nurseryman and was brought up among fruits, and while his book cannot compare with the systematic works which were being published at this time in Europe, he had an enormous influence in the encouragement of fruit-growing in America. A second edition, published in 1847, has several coloured plates, the first edition having only outline drawings. Space will not permit an enumeration of the many editions which have been issued of this work, the last being in 1886.

Another work of very similar character was *The American Fruit Culturalist* of J. J. Thomas, first published in 1846. This is cultural and descriptive and of the popular handbook order, and had achieved twenty-one editions by 1905.

In 1852 the first American Pomology on an extensive scale, with coloured plates, was published. This was *The Fruits of Amer-*

ica, by C. M. Hovey. Fairly good descriptions are given, and the plates, lithographs of a rather crude order, show the young wood, spurs, and leaves. It is a useful work, but not comparable with more recent works published in the same country.

Useful as were such works, there was no originality of treatment nor any really scientific description of fruits in them. The first author who can claim to have made a real contribution to pomology is Dr. John A. Warder, who, in his *American Pomology*, brought forward an original system of classification of apples. This work was published in 1867, and is occupied with the cultivation and description of apples only. This classification, like many others, was based first of all upon shape, and then subdivided into sections as to sweetness, colour, &c. He then proceeds to describe the fruits so classified, and these descriptions (of the fruit only) are a great advance on any previous work of the kind in his country. Very good outline drawings are given of many varieties.

The day of the nurseryman and amateur as pomological authors is now fast disappearing in America, and their place is filled by a benevolent Government which provides unlimited funds and expert specialists to write the books. The result of this combination is a happy one, and it is no exaggeration to say that never has pomology been so well supported as it is to-day in America. In no country are so many really fine systematic books now being produced, and recent publications have set a standard of exactness which cannot but benefit the study of fruits all over the world.

The first of these works is *The Apples of New York*, by S. A. Beach (2 vols. 8 vo., Albany, 1905). This is a purely descriptive work, with coloured plates or photographs of most of the varieties described. The descriptions are remarkably detailed, and deal with the tree as well as the fruit. References to literature are given very fully, and the commercial value and climatic preferences of the fruits are fully described. Of particular value is an introductory chapter dealing with characters which are of value in describing apples. This work is the best book on American apples, and is quite indispensable.

The next work of the same series is *The Grapes of New York*, by U. P. Hedrick (Albany, 1908). This is a large quarto volume, with full-sized coloured plates. An extremely interesting chapter prefaces the descriptions dealing with the various attempts to acclimatize the European vine in America. The descriptions themselves are a model of what such things should be, and no feature is overlooked. A very valuable point in all these works is that the fruits are described on a regular and definite system.

The next volume of this series is *The Plums of New York*, also by Professor Hedrick, uniform with the last named and published in Albany in 1911. This is exactly on the same lines as that on the grapes, and the introductory chapters, one historical, and another discussing the species from which have been developed the plums of the present day, are most valuable. Though dealing primarily with American varieties, European sorts which do well in the State of New York are included. There is no finer work on plums at the present time, and it is good to hear that further volumes on peaches and cherries are in course of preparation.

Two works of reference which are quite indispensable are those compiled by W. H. Ragan. The first is entitled *Nomenclature of the Apple, a Catalogue of the known Varieties referred to in American Publications from 1804 to 1904* (Washington, 1905). This is a useful work for establishing the priority of any name, and a short description of the fruit is given by a system of abbreviations which generally suffice to separate one fruit from another bearing the same name.

A similar work, entitled *Nomenclature of the Pear*, was published by the same author in 1908, and is on the same lines as the above, with the addition of a reference to literature in many cases.

Several excellent monographs have been published under State auspices in recent years, such as that on *The Fig*, by Gustav Eisen (Washington, 1901), and other works which are referred to under their separate headings in the Appendix.

Of the many excellent cultural works there is not space to

treat here. A special feature of recent years is the large number of very practical works on commercial fruit-growing, some of which will be found under the heading *Fruit Farming* in the Appendix.

Periodical Literature.—Of the first importance under this heading is the valuable *Report of the American Pomological Society*, issued biennially from 1852 to the present time. Many very interesting papers and reports will be found in it.

The only periodical works, I believe, devoted entirely to pomology are the *North American Pomologist* of HOFFEY (only vol. 1, 1860, published), and *The Orchardist's Companion*, by the same author (Philadelphia, 1841-3). This is a quarto, with full-sized coloured lithographs by the author, and is an interesting work historically, being the first American work with coloured plates of fruits. Unfortunately, public support did not suffice to permit its continued publication.

The reports of the U. S. A. Department of Agriculture (1862-1894), and the *Year-Book* published annually since that date, contain many good plates and descriptions of new and interesting fruits.

Dutch Works

A comparison of the literature of Holland with the interest and excellence in gardening of the Dutch is somewhat surprising. The Dutch evidently did not suffer from the *Cacoethes scribendi*, and it is not until the middle of the eighteenth century that we find any really important work. The culture of oranges and other citrous fruits was in great favour in the seventeenth century, and a few works were published upon their treatment, such as the *Citricultura* of FR. VAN STERBEECK, 1682, and the *Nederlantze Hesperides* of COMMELYN in 1676. Other gardening books, such as the *Nederlandsen Hof* of VAN OOSTEN and the *Pomona* of J. C. DOOR (1663), touch briefly upon fruits, but these need not be considered here.

The first great work of real importance was the *Pomologia* of J. H. KNOOP, which was published at Leeuwarden in 1758. It is of special interest as the first pomological work which was

fully illustrated with coloured plates. As may be expected, the colouring is somewhat crude, but nevertheless a very good idea of the various fruits is given. This work had great popularity and many editions were published, also a translation into French. A German translation, published at Nürnberg in 1760, should be noted, as the second volume is an entirely new production, the author being, on the authority of Mayer, Pastor Zink, of Meiningen. Knoop's work is wholly descriptive, as he had treated cultural matters in an earlier volume, namely, *Beschouwende en Werkdagige Hoveniers-Konst* (Leeuwarden 1753).

From this date until recent times there is a remarkable gap in Dutch pomological literature, and I can find no work of real importance until the work of Van Noort, *Pomologia Bstava*, of *Avbeelding en Beschryving van onderscheidene soorten van Appelen en Peeren* (Leiden, 1830-1840; 20 apples and 20 pears illustrated), which I have not yet seen.

A modern work of great value on account of its record of Dutch varieties not figured elsewhere is the *Nederlandsche Boomgard*, which was published at Boskoop in 1868. The editors were Ottolander-Koster, Hooftman, and Overeijnder, and the coloured plates were by Berghuis. These plates are excellent, and the descriptions given full and exact.

Portuguese Works

I have been able to find only one book of strictly pomological interest in Portuguese—the *Diccionario das Peras Portuguezas* by Olivieria (Oporto, 1879. large 8vo.). There is doubtless much to be added to this list.

Spanish Works

The pomological literature of Spain seems to be very scanty. In the elaborate *Diccionario de Bibliografia Agronomica* by Anton Ramirez, no work of importance is recorded. The only books I have seen are those of D. F. Salay Arnella, entitled *Frutales* (Barcelona, 1860, 8vo.), a small cultural work upon the

origin and cultivation of fruit trees, dealing with them from the nursery stage upwards, and the *Pomona de la Provincia de Murcia* of Don José y Perez (Madrid, 1884, 4to.), with short cultural notes and fairly full descriptions of various fruits.

A few interesting papers may be found in certain journals, such as the *Agricultura Española* (1858-61) (vol. 1 contains a list of Pears and Almonds), and in the *Boletín d'Agricultura* (Madrid, 1857).

Russian Works

Russian works on pomology are not many, and I believe the following names include the most important:—*Kratkaya Pomologia*, by Ussikov (Petrograd, 1900), an octavo volume with plain lithographs of apples and pears. Plums and peaches, &c., are described, but not figured. *Pomologie* by Leon Simirenko (8vo., 1901), contains photographs of nearly all fruits, with special reference to Crimean varieties. A new and enlarged edition appeared later.

The finest work is probably the *Atlas Plodov* (Petrograd, 1903-7, 4 vols. large 8vo.), with 100 coloured plates. This is a magnificent work which equals the best done in France or England. The plates for the most part are original and of great merit, both pomological and artistic. Some few of the illustrations, however, are borrowed, from the *Aepfel und Birnen* of Goethe and others, and these are markedly inferior. So far as I can ascertain, this book is the best and most complete Russian work yet published.

An index of names in roman type renders it useful to those who do not read Russian.

Belgian Works

The pomological literature of Belgium will naturally only date from the early nineteenth century, though certain small works, such as *Essai sur la Greffe*, by Cabnias (Liège, 1784), antedate that period. The independent and important horticultural history of Belgium, however, reached its highest point in the middle of the last century, and its literature naturally reflects this period.

The first work which claimed readers beyond the national boundaries was the work of Van Mons, *Arbres Fruitiers. Leur Culture en Belgique et leur Propagation par Graine* (Louvain, 1835). This work contains the fullest statement of the famous theory of Van Mons on raising seedling fruits. It must be confessed that the student will have to search carefully therein to find this theory, so overlaid is it with repetition and contradictions. The work, however, provided material for many lengthy disputations, and so served a useful purpose as a stimulant if not as an exposition.

Of greater interest for our present purpose is the catalogue of his nursery, *Catalogue Descriptif Abrégé, contenant une Partie des Arbres Fruitiers qui depuis 1798 jusqu'en 1823 ont formé la Collectin de J. B. Van Mons* . . . (Louvain, 1823, 8vo.). The historical value of this little work is very great, and it is now exceedingly scarce.

The successor to Van Mons was Alexandre Bivort, and in 1847-51 he published his *Album de Pomologie*, an oblong folio in four volumes. This book is of great value as it contains coloured plates and accurate descriptions of many of Van Mons' seedlings, and forms a wonderful record of the great number of new fruits which were at this time being raised in Belgium. The coloured plates are fairly good, better in the later volumes, and the descriptions are excellent.

The next important work was the result of royal munificence, and was entitled *Annales de Pomologie Belge et Étrangeré*. This was edited by L. de Bavay, Auguste Royer, Auguste Hennau, and Bivort. Eight large folio volumes were published, the first in 1853 and the last in 1860. The descriptions of many fruits are taken from Bivort's *Album*, but the greater number are original. The plates are well produced, but are not quite of the highest excellence. This work had a great success and remains the classical work of reference, with Bivort's *Album*, for varieties of Belgian origin. Since 1860 no important pomology has been published in Belgium, but there are two works of historical interest which may be mentioned here. The first is the *Pomone Tournaisienne* of J. B. C. du Mortier, Tournay,

1869. It is an attempt to record the gains of the Belgian pear-raisers; the author's historical remarks are interesting, and are followed by a list of fruits under their raisers' names; and finally outline drawings and short descriptions are given of ninety-one selected pears. It must be said, however, that the lists are in several cases incomplete, and the book cannot therefore be entirely relied upon.

A better and more accurate attempt at the same object is the paper on Belgian fruits by Charles Gilbert, published in the *Journal of the Royal Linnean Society of Belgium* in 1874. This gives the names of all Belgian raisers and their gains, and includes some very excellent critical notes upon the re-namings that so many of these fruits have undergone.

The cultural works published towards the end of the nineteenth century are very numerous, but they need not be detailed here. Reference cannot, however, be omitted to the excellent work of Pijnaert, *Les Serres Vergers*, which was published about 1880 and contains the fullest directions for the forcing of all fruits under glass with a wealth of detail not met with in any other work I am aware of.

Periodical Literature.—Belgium has been fortunate in her periodical literature, and the skill of her native gardeners and lithographers has made much of it of permanent value. Especially useful is the *Bulletin d'Arboriculture*, which was started in 1865. The articles and coloured plates of fruits are numerous and good, and an excellent index added in 1883 renders these readily available.

Another valuable publication is the *Belgique Horticole*. This is especially good in historical information, and the complete series runs from 1850 to 1885.

The *Flore des Serres*, though generally devoted to flowering plants, has some good plates of fruits, especially in volume 19 (1871-3).

Italian Works

In the earlier part of this paper mention was made of the interesting volume of Venuti as probably the first book dealing

exclusively with fruit. There are also a few other Italian authors who merit attention before the more modern works are considered.

It is natural that early Italian literature should deal very largely with the Vine, but this is rather outside our scope. The authors of the sixteenth and seventeenth centuries were mostly adapters or compilers from the ancients, and such books as that of Giovanni Tatti, *Della Agricoltura* (Venice, 1560), with its short notices of fruits, are of interest only historically. A more useful book was that of G. Soderini, *Trattato della Coltivazione delle Vite e del frutto che se ne può cavare*. . . . (Firenze, 1600). The well-known *Vinti giornate d'Agricoltura* of Agostino Gallo (Torino, 1519) is a type of country book which was fairly common at this time.

No really important work, however, was published until, 1633, when Giovanni Battista Ferrari, a Jesuit monk of Siena, published his *Hesperides, sive de Malorum aureorum cultura et usu*. This is a folio, with elaborate plates of oranges and lemons, and of gardens and garden tools. The fruits are very fully described and some unusual types depicted, which may also be seen in the Dutch works on oranges which followed in the later years of the seventeenth century. It is entirely in Latin, and is a remarkable example of an early treatise upon citrous fruits.

In the eighteenth century I have found little of note; a translation of *Le Jardinier François* was published in 1723, and an interesting book upon the peach, entitled *Trattato di Coltura di Persici e di Alberi di frutto* (Venice, 1792). This is an elaborate cultural work of some 240 pages.

The finest Italian pomology was, without doubt, the work of Galesio entitled *Pomona Italiana ossia Trattato degli Alberi Fruttiferi* (3 vols., 172 coloured plates, Pisa, 1817-39, folio). The plates are of varying merit, some being of great excellence and others very poor. A very special feature is the large number of figs which are illustrated and described. This work is now extremely scarce, but a copy is in the Lindley Library.

A few years later a useful work was prepared by A. Picciolo, entitled *Pomona Toscana, che contiene una breve descrizione di*

tutti i frutti che si coltivano nel suolo Toscano per servire alla collezione in gesso medesimi (Firenze, 1820).

The only recent pomology which has come to my notice is the recent work entitled *Pomologia: descrizioni delle migliori varietà di Albicocchi, Ciliegi, Meli, Peri, Peschi*, by Girolamo Molon (Milan, 1901). This is a small octavo of some 700 pages, entirely descriptive, and with a few coloured plates and some photographic illustrations. A useful feature is the very full reference to literature given for each variety, and the discussions on the species should also be mentioned.

Scandinavian Works

The pomological literature of Scandinavian countries is rarely met with in the libraries of Central Europe, and this list cannot be put forward as including all important works, but is as complete as my present opportunities can make it.

The earlier works were mainly of the cultural order, and the first I have found dealing with fruit trees alone is the *Konsten at Skära Frukt Träd* (The Art of Nursing Fruit Trees), by J. J. Fragroeus.

The great botanist Peter Kalm did not disdain to write of the fruit and kitchen garden, and several pamphlets were published by him on fruit trees about the year 1757.

Of the works of the nineteenth century the following are probably the most important:—*Svensk Pomona*, by Olaf Ene-roth (1864–1866), descriptions and plates of fruits, but the drawing and colouring are coarse; *Den Danske Frugthave. Et Billedværk for Udbredelse af Kjendskab til Landets Frugter ud-givet af et Selskab* (Svendborg, 1869–70–71), 120 plates; *Svenska Trädgårdsföreningens Tidskrift redigerad af Axel Pihl och Jakob Eriksson* (1878 and fol.), contains many coloured plates of fruits; *Svenska Fruktorter i färglagda Afbildningar utgifna af Svenska Trädgårdsföreningen, under redaktion af Axel Pihl och Jakob Eriksson*, Stockholm (1899 and foll.); and *Haandbog i dansk Pomologi, af H. C. Bredsted*, 3 vols., Odense (1890–1896), with descriptions and outline drawings.

APPENDIX

A SELECTION OF IMPORTANT POMOLOGICAL WORKS

I. GENERAL POMOLOGIES

This section includes the more important descriptive works.

1. ENGLISH.

KNIGHT, T. A. *Pomona Herefordiensis*. (Cider Fruits.) 1 vol. 4to. col. pls. London, 1811.

BROOKSHAW, G. *Pomona Britannica*. 1 vol. atlas folio, 1812.

— *Pomona Britannica*. 2 vols. 4to. col. pls. London, 1817.

HOOKE, W. *Pomona Londinensis*. vol. 1 (all pub.) fol. col. pl. London, 1818.

LINDLEY, JOHN. *Pomological Magazine, or Pomologia Britannica*. 3 vols. roy. 8vo. col. pls. 1828-30.

— GEORGE. *A Guide to the Orchard and Kitchen Garden*. 1 vol. large 8vo. London, 1831.

RONALDS, HUGH. *Pyrus Malus Brentfordiensis; or a Concise Description of selected Apples*. 1 vol. 4to. pls. London, 1831.

HOGG and BULL. *The Herefordshire Pomona*. 2 vols. fol. col. pls. London and Hereford, 1876-1885.

HOGG, ROBERT. *The Apple and its Varieties*. 1 vol. 8vo. Illus. London, 1851.

— *The Fruit Manual: A Guide to the Fruits and Fruit Trees of Great Britain*. 1 vol. 8vo. 1st. ed., London, 1860; 2nd ed. 1862; 3rd ed. 1866; 4th ed. 1875; 5th ed. 1884.

SCOTT, JOHN. *The Orchardist, or Catalogue of Fruits Cultivated at Merriott, Somerset*. 1 vol. 8vo. 1st. ed. 1868, 2nd ed. 1873.

2. AMERICAN.

COXE, WM. *A View of the Cultivation of Fruit Trees and the Management of Orchards and Cider*. 1 vol. 8vo. Illus. Philadelphia, 1817.

EMMONS, EBENEZER. *The Natural History of New York*. Vol. iii. *Fruits*. 2 parts, col. pls. Albany, 1851.

DOWNING, A. J. *The Fruits and Fruit Trees of America*. 1 vol. roy. 8vo. col. pls. New York, 1845. Revised 1857, 1869. Appendices, 1872-76-81.

THOMAS, JOHN J. *The American Fruit Culturist*. 1 vol. roy. 8vo. Illus. New York, 1st. ed. 1846, to 21st ed. 1903.

HOVEY, C. M. *The Fruits of America*. 2 vols. 8vo. col. pl. Boston, 1852-56.

WARDER, JOHN A. *American Pomology: Apples*. 1 vol. cr. 8vo. Illus. New York, 1867.

3. FRENCH.

DUHAMEL DU MONCEAU. *Traité des Arbres Fruitières, contenant leur figure leur description, leur culture, etc.* Paris, 2 vols. 4to., 1768.

MIRBEL, POIRET, ET LOISELEUR DES LONGCHAMPS. *Traité des Arbres Fruitières*. Nouvelle édition. 150 col. pls. by Redouté and Bessa. 2 vols. folio. Paris (1820?).

J. ST. HILAIRE, MIRBEL, POIRET, ET LOISELEUR DES LONG CHAMPS. *Nouveau Traité des Arbres Fruitières*. . . . 2 vols. folio. Paris (1850?).

POITEAU ET TURPIN. *Traité des Arbres Fruitières*. . . . 418 col. and 2 plain pls. Paris and Strasbourg, 1807-35. 6 vols. folio.

POITEAU, A. *Pomologie Française* 4 vols. folio. 433 col. pls. Paris and Strasbourg, 1846.

NOISETTE, LOUIS. *Le Jardin Fruitiier: histoire et culture des arbres fruitiers*. . . . 3 vols. 4to. Paris, 1821. 2nd ed. 2 vols. 8vo. 1839.

DECAISNE, JOSEPH. *Le Jardin Fruitiier de Muséum*. . . . 9 vols. 4to. Paris, 1858-75.

— *Pomologie Générale de la France*. 8 vols. 8vo. Lyon, 1863-1871.

DE MORTILLET, P. *Les Meilleurs Fruits par ordre de Maturité et par Série de Meritte*. 3 vols. 8vo. Grenoble, 1865-68.

LEROY, ANDRE. *Dictionnaire de Pomologie*. 6 vols. 8vo. Paris, 1867-1879.

MAS, ALPHONSE. *Le Verger*. . . . 8 vols. col. pls. Paris (1865-1874?).

— *Pomologie Générale*. 12 vols. 4to. Paris, 1872-1883.

ANON. *Les Meilleurs Fruits au Début du XX^me Siècle*. 8vo. 1 vol. [1907?].

— *Catalogue descriptif des Fruits adoptés par le Congrès Pomologique*. 1 vol. 8vo. Lyon, 1887; Suppl. 1896.

4. GERMAN.

MAYER, J. *Pomona Franconica*. 3 vols. 4to. 253 col. pls. Nürnberg, 1776-1801.

MANGER, H. L. *Vollständige Anleitung zu einer systematischen Pomologie*. 1 vol. folio. Leipzig, 1780.

KRAFT, JOHANN. *Pomona Austriaca*. 2 vols. folio. 200 col. pls. Vienna, 170-96.

CHRIST, J. L. *Vollständige Pomologie*. 2 vols. 50 col. pls. Frankfurt, 1809-13.

DIEL, A. F. A. *Versuch einer systematischen Beschreibung*. . . . *Kernobstsorten* 24 vols. 8vo. Frankfurt, 1799-1825.

BARON VON AEHRENTHAL. *Deutschlands Kernobstsorten*. 3 vols. 4to. 98 col. pls. Leitmeritz, 1833-42.

DITTRICH, J. G. *Systematisches Handbuch der Obstkunde*. 2 vols. 8vo. Jena, 1837.

LANGETHAL, L. E. *Deutsches Obstcabinet in naturgetreuen fein colorirten Abbildungen*. 4to. Jena, 1855-6-7-8 (?1853-60).

HINKERT, J. W. *Systematisch-geordnetes Handbuch der Pomologie*. 3 vols. 8vo. Munich, 1836.

DOCHNAHL, F. J. *Der sichere Führer in der Obstkunde*. 4 vols. 8vo. Nürnberg, 1855-60.

JAHN, LUCAS, UND OBERDIECK. *Illustriertes Handbuch der Obstkunde*. 8 vols. 1859-75, and three extra vols. *Zusätze und Berichtungen zu Bänder I, und IV.*, by J. Oberdieck, 1 vol. 8vo. 1868; *Supplement Birnen*, Lucas and Oberdieck, Stuttgart, 1879. 1 vol. 8vo.; and Lauche's *Erster Ergänzungsband*, Berlin, 1883. 1 vol. 8vo.

LAUCHE, W. *Deutsche Pomologie*. 6 vols. 8vo. 300 col. pls. Berlin, 1882-3.

5. BELGIAN.

BIVORT, A. *Album de Pomologie*. 4 vols. folio. Bruxelles, 1847-51.

BAVAY, L., ROYER, A., AND OTHERS. *Annales de Pomologie Belge et Etrangère*. 8 vols. folio. Brussels, 1853-60.

6. ITALIAN.

GALLESIO, G. *Pomona Italianica*. 3 vols. folio. 172 col. pls. Pisa, 1817-39.

MOLON, G. *Pomologia*. 1 vol. 12mo. Milan, 1901.

7. RUSSIAN.

USSIKOV. *Kratkaya Pomologia*. 1 vol. 8vo. Petrograd, 1900.

SIMIRENKO, LEON. *Pomologie*. 1 vol. 8vo. 1901.

GREBNITZKY. *Atlas Plodor*. 4 vols. large 8vo. 100 col. pls. Petrograd, 1903-7.

8. PORTUGUESE.

OLIVIERA. *Diccionario das Peras Portuguezas*. 8vo. Oporto, 1879.

9. SPANISH.

PÉREZ, JOSÉ. *Pomona de la Provincia de Murcia*. 1 vol. 4to. Madrid, 1884.

10. DUTCH.

KNOOP, J. H. *Pomologia*. 2 vols. folio, col. pls. Leeuwarden, 1758.

VAN NOORT. *Pomologia Batava*. 1 vol. Leiden, 1830-40.

OTTOLANDER AND OTHERS. *Nederlandsche Boomgard*. 2 vols. 4 to. Boskoop, 1868.

11. SWISS.

ANON. *Schweitzerische Obstsorten*. 2 vols. oblong folio, col. pls. St. Gallen, 1866, 1872. Vol. i. Apples; vol. ii, Pears.

II. SPECIAL MONOGRAPHS ON VARIOUS HARDY FRUITS

1. THE APPLE.

RONALDS. *Pyrus Malus Brentfordiensis*. See p. 433.

HOGG AND BULL. *The Herefordshire Pomona*. See p. 435.

HOGG, R. *The Apple and its Varieties*. 1 vol. 8vo. 3 illus. London, 1851. See p. 434.

ENGELBRECHT, TH. *Deutschlands Apfelsorten*. See p. 426.

BARRON, A. F. *British Apples*. Report of the Committee of the National Apple Congress. 5 pls. 8vo. London, 1884.

BEACH, S. A. *The Apples of New York*. 2 vols. 8vo., col. pls. Albany, 1905. See p. 438.

RAGAN, W. H. *Nomenclature of the Apple*. Washington, 1905.

ANON. *Unsere besten Deutschen Obstsorten*. Vol. 1. *Apples*. 4to. 41 col. pls. Wiesbaden (1914?).

2. THE APRICOT.

THOMPSON, R. *Apricot. A Report upon the Varieties of the, Cultivated in the Gardens of the Horticultural Society*. See R. H. S. Transactions, Series II. vol. i. p. 56-74.

LAUCHE, W. *Deutsche Pomologie*. See p. 426.

MAS, A. *Le Verger*. See p. 430.

3. BUSH FRUITS.

DOCHNAHL, F. J. *Der sichere Führer in der Obstkunde*, vol. iv., 1860. See p. 425.

PUCCI, A. *Frutti Minori, Fragole, Pojoni, Ribes, Uva spina, e Lamponi*. 18mo. 96 figs. Milano, 1895.

LEBEL, M. *Anzucht und Kultur der Johannisbeere, Stachelbeere, Himbeere etc. . . . und der Bereitung der Beerenweine*. Illus. No date. (Modern.)

VERCIER, J. *Le Cassis, son Histoire, sa Culture, etc.* Brochure, 76 pp. 12 figs. (Modern).

CARD, F. W. *Bush-Fruits. A Horticultural Monograph of Raspberries, Blackberries, Dewberries, Currants, Gooseberries, and other shrub-like Fruits*. New York, 1907 (4th ed.) 1 vol. 8vo. Many illus.

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COLLECTION OF EREMURI
T. A. HAVEMEYER, ESQ.
BROOKVILLE, L. I.

The Foxtail Lily*

By T. A. Havemeyer



PERHAPS the stateliest and noblest members of the great Lily family are the *Eremuri* or Foxtail Lilies. They throw up spikes from four to ten feet high, according to the variety, a spike often containing several hundred flowers, and forming a beautiful column of white, cream, lemon, deep yellow, soft pink, deep pink, salmon or orange. The early flowering species, such as *Elwesianus*, *Himalaicus* and *robustus* bloom in June followed by *Bungei*, *Olgae* and the hybrids.

It is unfortunate that these lovely plants are not better known in American gardens, they are of easy culture and when established nothing can equal them for magnificence with their great flower stalks, taller than a man, crowned with a spike of flowers 2 to 4 feet long. They should be planted with a background of shrubs to show to the greatest advantage.

The best known varieties are:

ROBUSTUS, rosy pink. A beautiful, vigorous species flowering early in June, 8 to 10 feet.

HIMALAICUS, pure white, flowers in June, 6 to 8 feet.

ELWESIANUS, soft pink, enormous spikes. A vigorous, distinct form of *robustus*. Flowers in June, 10 to 12 feet.

*This interesting group of plants is better known in England than here. In the *Botanical Magazine* for September, 1899, Mr. J. G. Baker says that about 30 species were known to him at that time. Twenty of these are found in central Asia, only one being known from the Himalayas. The plants flower easily in England, Ireland and parts of Scotland, and a reference to our illustration shows what they will do in the latitude of New York. There is a very comprehensive account of *Eremuri* by M. Mottet in the *Journal de la Société Nationale d'Horticulture de France* for 1901. on page 804. M. Mottet not only describes each variety but gives a scheme for distinguishing one species from another. It is a paper which should be read by all growers of *Eremuri*.—ED.

BUNGEI, deep yellow, flowers in July, 4 feet.

OLGAE, white, ribbed with brick-red, often delicately shaded with pink. Flowers in July 6 feet.

Besides the above there are many interesting hybrids, such as: *Bungei pallidus*, *Bungei superbus*, Him-rob, Shelford, Sir



ROOT OF EREMURUS ROBUSTUS ELWESIANUS

Michael, Tub-rob, etc., etc., in all shades of pink, yellow and orange.

Eremurus robustus and *Olgae* come from Turkestan. *E. himalaicus* from the Himalayas and *Bungei* from Persia.



EREMURUS ROBUSTUS ELWESIANUS (TALLEST)
TESTING GARDEN OF J. SCHEEPERS, INC.
T. A. HAVEMEYER ESTATE

Aquatic Gardening

By George H. Pring



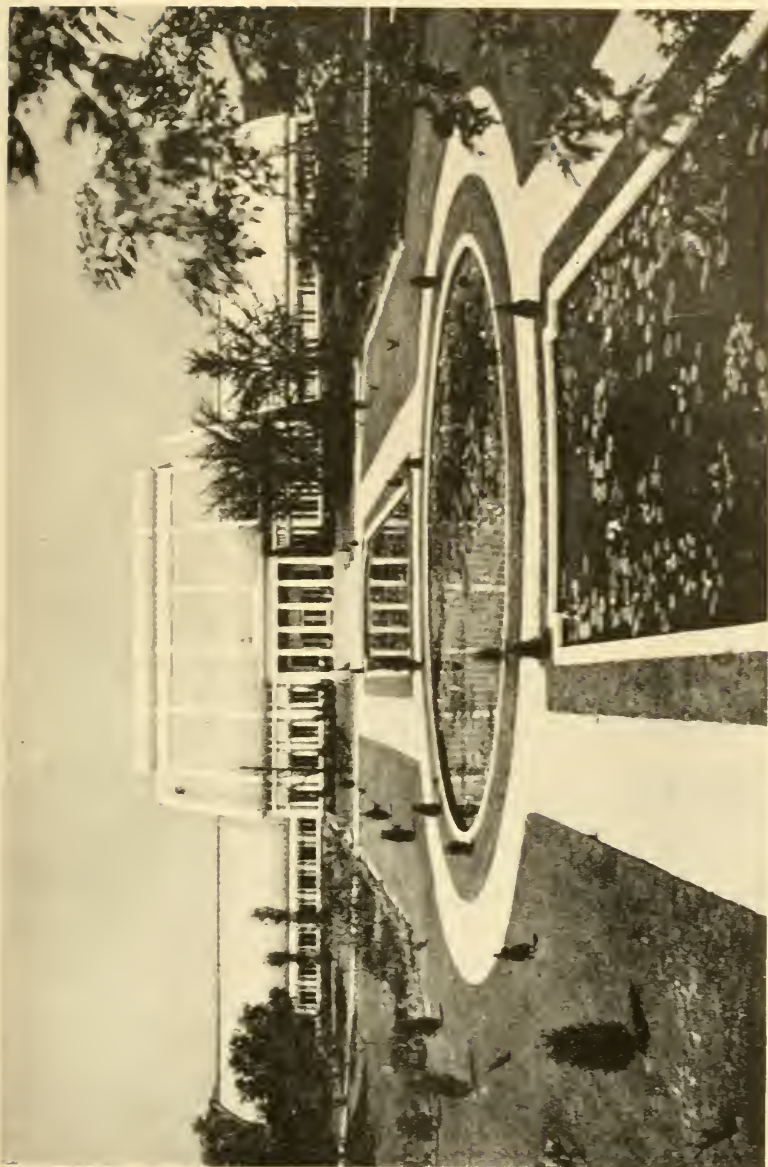
AQUATIC gardening is the study of plants adapted to growing in water, either submerged or floating and embracing the semi-aquatic plants used in environmental plantings. The water lily is one of the most important of the aquatic plants and its cultivation is becoming more and more popular every day. This may undoubtedly be ascribed to the exquisite flowers, particularly of the later hybrids, with their great variety of colors. The water itself is a factor which enters strongly into the beautifying of the landscape and in that way lends assistance in popularizing the water plants.

The geographic distribution of the water lilies is practically world wide, being represented in the low lands of the temperate, subtropical and tropical regions. The *Castalia* group commonly called the hardy lilies is native throughout the Atlantic coastal plains of North America and Europe. Florida and Mexico furnish *Nymphaea flavovirens* and *Nymphaea flava* of the *Brachyceras* group. The *Hydrocallis* group of nocturnal habit comes from South America, but is unfortunately rarely seen in cultivation. It is readily distinguished by club shaped carpellary styles. Australia furnishes the beautiful *Nymphaea gigantea*, the only representative of the *Anecphyra* group, and extremely tender in habit. The *zanzibariensis* and *stellata* varieties are indigenous to Africa. The above are the common diurnal representatives met with in water lily collections. The nocturnal species—*N. lotus* and *N. rubra*—are native of Egypt and India. Both of these are found planted around Hindoo temples and are said to be held sacred by the natives.

The cultivation of the water lily is one of the oldest branches of floriculture and dates back to remotest antiquity. It was

not only valued florally but economically as well by the early races. Both the tuber and the seeds were used for food. Even at the present time in some countries economic value is attached to the plant. A Chinese writer of the eleventh century is quoted in Giles *Gems of Chinese Literature*. "Since the opening days of the Tsang Dynasty (660 A. D.) it was fashionable to admire the peony, but my favorite is the water lily." The water lily of China is the pigmy of the genus—*N. tetragona*, pure white and frequently seen in garden collections. In Egypt the relation of the water lily and religious life was more extended. Two species are figured upon the monuments and tombs—*N. lotus*, the night-blooming lily, and *N. coerulea* the blue day-blooming lily. Plete found the white lotus only on a single tomb belonging to the 12th Dynasty about 2500 B. C. In 1884 Schweinfurth found petals of the white lotus along with those of the blue in the funeral wreaths of Rameses II. The use of flowers for funeral decorations was notable in the 19th and 21st Dynasties. The custom was to lay wreaths and semicircles of flowers on the breast of the wrapped corpse. Flowers of *N. coerulea* on petioles 18 to 20 inches long were fastened between the bands encircling the mummies of Rameses II. In the coffins of the same monarch were also found breast wreaths composed chiefly of petals and sepals of *N. coerulea* and *N. lotus* (1580 B. C.)

The German botanist Schweinfurth (1884) did considerable research work in Egypt relative to the preserved material in the tombs of the various dynasties. In every case the specimens found were as well preserved as newly made herbarium material, allowing him to soak the specimens in water, press them and mount them upon regular herbarium sheets. The success of the work is attested to by eleven cases of specimens located in the Boolak, British and other continental museums. A wreath of lotus was figured in *Nature* in 1883, consisting of rigid leaves of *Mimusops Schimperi* (specimens of this genus are in cultivation at the Missouri Botanical Garden) folded in two or four and fastened together with the fiber of the date palm in such a manner as



FORMAL WATER GARDEN
MISSOURI BOTANICAL GARDEN
ST. LOUIS

to clamp and hold the lotus flowers without piercing them, the whole being strung upon leaves of the date palm. Schweinfurth compared this ancient material with the present day Egyptian lotus and was unable to detect any difference. The conclusion arrived at is that the species is not suffering transmutation or that the changes are infinitely slow. In this connection it may also be noted that the climate of Egypt is very nearly the same as it was 4000 years ago.

Hybrids and Garden Varieties

The development of the lily is of comparatively recent date, the first hybrid having been produced in 1851. It was *N. devoniensis* raised by Paxton, gardener to the Duke of Devonshire, who built special aquatic greenhouses for the cultivation of water lilies and through this influence popularized the culture in Europe. This hybrid between *N. lotus* and *N. rubra* was described in *Gardeners Chronicle* July 10, 1852, but there is a doubt as to the authenticity of the *N. lotus* parentage, the claim being made that it is merely a seedling of *N. rubra*. Hooker and Thomson both state that a similar form is of common occurrence in India. The next hybrid appeared in 1852 in Van Houtte's aquaria, between *N. lotus* and *N. rubra*. This offspring was not questioned owing to its intermediate habit. The hybrid was named after the originator—Ortgies. In 1853 M. Bouche of the Berlin Botanic Garden crossed *N. ortgiesiana* and *N. lotus*, obtaining the hybrid *N. Boucheana*, which shows a marked influence of *N. lotus* through its pale pink petals bordered with pure pink, the yellow stamens and the bright green leaves. This hybrid is thought to be sterile, but it has yielded seeds readily when grown in St. Louis, which is probably due to the favorable climatic conditions. *N. Kewensis* was the next to appear. It was described in the *Gardeners Chronicle* (1887) and in the *Botanical Magazine* in April 1888. The cross was made by William Watson, curator of Kew Botanic Gardens, between *N. lotus* and *N. devoniensis*. This hybrid still holds



NYMPHAEA, MRS. EDWARDS WHITTAKER
VAR. MARMORATA
FLOWERS TWELVE INCHES ACROSS

a prominent place in many collections, having a large number of broad pink petals, orange colored stamens and leaves pinkish-green above.

From this period the work was continued in the United States, where the climatic conditions are superior to those of Europe. In 1885 Sturtevant obtained a seedling by selection from *N. devoniensis*. Later Peter Bisset crossed *N. dentata* and *N. Sturtevantii* resulting in *N. omorana*. From this was secured by Dreers a dark-flowered type called George Huster. The darkest of all water lilies up to the present time were produced by selection by James Gurney of Tower Grove Park, St. Louis and they appeared under the names Frank Trelease, Rufus J. Lackland, and James Gurney. The parentage of these is doubtful. Frank Trelease appeared first as a seedling from *N. devoniensis*. Rufus J. Lackland was a seedling of Frank Trelease and James Gurney the darkest of all was obtained from Rufus J. Lackland. In 1888-1890 the hardy lilies were revolutionized by the work of the French hybridist M. Latour Marliac, whose achievements won universal admiration. For trade reasons Marliac abstained from naming the parentage, but an expert can readily observe it, which seems to be indicated in the offspring with considerable certainty. The first members of the series were the yellows—*N. Marliacea chromatella*, *N. odorata sulphurea* and *N. tetragona helvola*. All of the above were derived from the southern species—*N. mexicana*. *N. odorata rosea* is one of the parents of the pink types, while *N. alba rubra*, native of Sweden, is responsible for the hybrids with red tints at the centers of the flowers. Marliac's hybrids have been improved in this country but they still hold a prominent place in our pools of to-day.

The *Brachyceras* group commonly represented by *N. Zanzibariensis* has been considerably improved by American hybridists. Credit however is also due to another European hybridizer Caspary who published his results as early as 1862. Our own hybrids, *N. pulcherrima* (Tricker 1897), *N. pennsylvanica* (Conard 1901) and the various hybrids between *N. flavo-*

virens and *N. Zanzibariensis*, known as Mrs. C. W. Ward, Wm. Stone and Stella Gurney are well in advance of the old species. It has been claimed that the above are all sterile but experiments conducted at the Missouri Botanical Garden covering a period of four years, have shown that seeds are produced quite readily by Wm. Stone and somewhat less so by Stella Gurney.



NYMPHAEA, MRS. EDWARDS WHITAKER (Pring, 1916)

The introduction of *N. ovalifolia* has given the hybridist the much needed material for improvement in the size of the flower. The Missouri Botanical Garden hybrids between *N. ovalifolia* and *Nymphaea castaliiflora*—Mrs. Edwards Whitaker and its variety *marmorata* (Pring 1916) have the peculiar phenomenon of bleaching from light blue to white, the flowers attaining the huge size of 12 inches. The marmorate form

of leaf is considerably intensified over the parent *N. ovalifolia*. Complete results have been published by the writer in "hybrid Nymphaeas" (*Annals Missouri Botanical Garden*, Vol. 4, No. 1.)

The winter-flowering hybrids are now receiving considerable attention especially for the use of the florist for cut flowers during the winter season. Wm. Tricker leads the production of *N. Panama Pacific* and *N. Woodrow Wilson*. These hybrids have been secured through the influence of an African species—*N. micrantha*, whose habits are so noteworthy that they should be utilized to their fullest extent for future hybrids. The factor of leaf propagation for the increase of stock is one of unusual interest in this African species.

Pollination

A large percentage of the present day diurnal hybrids is frequently the result of insect agencies. This method relieves the grower of considerable care and attention, but from the standpoint of the breeder it is rather unfortunate as he is unable to determine the pure strains which are necessary for his work. The number of species under cultivation is at present quite limited, due to the inability of the various groups to intercross. A hybrid between two distinct groups would indeed be a noteworthy feature.

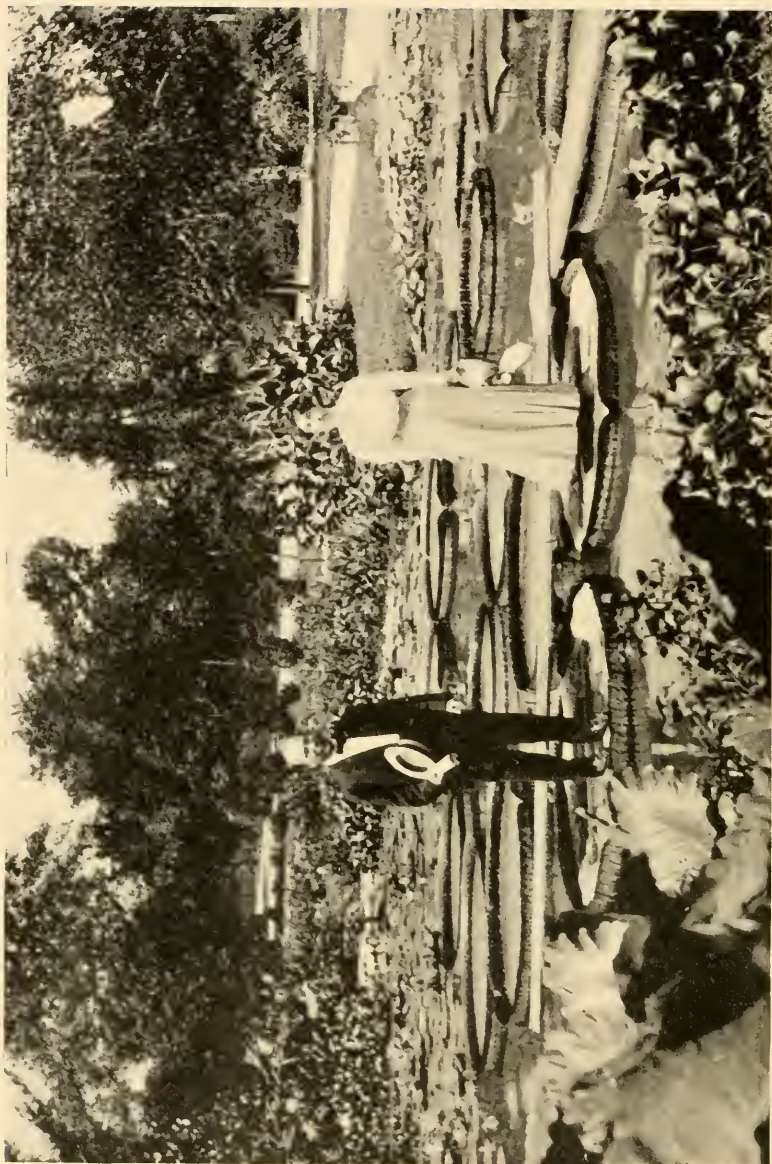
The preparation of the flowers, either pistillate or staminate should be thorough. The plants selected for breeding should be of the highest type and consideration be given to size, color, number of petals and stamens, and leaf characters especially those of viviparous habit. The staminate flower or pollen parent should be covered during the bud stage to exclude insects thus preventing them from leaving foreign pollen on the anthers. For this purpose a thin piece of cheese cloth fastened below the ovary is sufficient. The pollen may be collected during the second day after the flower opens, the outer whorl yielding their pollen first, followed in suc-

cession by the other whorls. The pistillate or seed-bearing parent should be emasculated in the bud stage, using a small pair of forceps to reach into the closely packed perianth and remove the stamens. This emasculation is an important factor even though the ovary becomes receptive before the whole of the anthers yield their pollen. The removal of the pollen from the previously prepared flower is accomplished



NYMPHAEA, WILLIAM STONE

by the use of a camels hair brush or by removal of the anthers with the forceps and dropping these into the nectar which collects in the concave ovary when it is in a receptive condition. The petals and sepals should be cut in half, the flower wrapped in cheesecloth and fastened with twine below the ovary, while the remaining end is fastened to a bamboo support, leaving enough twine to allow for ripening the seeds normally below



VICTORIA REGIA
TOWER GROVE PARK
ST. LOUIS

the surface, The crosses should be labelled with a number to correspond to the record. In the Missouri Botanical Garden *Nymphaeas* mature during August, when hybridization is done. The seeds generally mature in three or four weeks, the seed pods are collected, the covering removed and the pods placed in water to allow for total disintegration of the covering and thorough ripening of the seeds.

Cultivation

The seeds of *Nymphaeas* soon lose their vitality when kept dry, owing to their thin protective covering, thus allowing evaporation to take place rapidly. It is therefore essential to sow them as soon as possible after maturity. Small half barrels are used for sowing seed. The tub should be filled half full of good sod soil, the upper surface of which is finely screened to a depth of one inch. The seeds should be sown on the surface taking care not to overcrowd and then covered with a quarter of an inch of finely screened sand. The tub should then be filled with water using a sprinkling can with a fine spray so as not to disturb the seeds. The best location for the tubs is in a greenhouse where plenty of light is available at all times and where a temperature of 65° F. may be maintained. *Nymphaea gigantea* requires 75–80°. During February the seedlings may be transplanted into pots and placed into growing tanks built on benches near the glass and containing approximately 10 inches of water. The time for planting outside depends upon the locality. The second week in May is a suitable time for the Middle West.

The parent plants of the lotus group reproduce readily by small tubers attached to the base of the old rhizome, which has completed its life cycle. The plants when lifted in the autumn are brought in the greenhouse and dried off, cleaned and the young tubers saved and placed in sand. During the middle of February they should be potted in a mixture of sod and sand and placed in growing tanks at a temperature of 70° F. until transplanting in the outside ponds.

The *Brachyceras* types or "day bloomers" will not stand this drying off. They should be lifted and kept in water during their resting period when the tops die down. In February these should be cleaned, the side rhizomes removed from the parent and both potted and subsequently treated like the previous group. The parent tuber unlike the lotus type will last for several years, increasing in size annually.

The *Castalia* group or the hardy lilies need the least attention of the whole order especially when planted in natural ponds. The manner of growth is by means of a continuous rhizome which subdivides and for that reason the plants must be confined to a certain area. *N. tuberosa* as the name indicates reproduces by means of tubers, which form readily making it a rampant grower. When planted in the free ground they will need transplanting every three or four years. In view of the fact that these plants are left outdoors over winter, the water should be deep enough to prevent freezing of the rhizomes. In St. Louis the hardy lilies begin to go back in August due undoubtedly to the hot weather. The hardy group is the one that the amateur should select as the nucleus of his collection. An ordinary half barrel will be sufficient to grow a single specimen if there are no pools for the purpose.

Water lilies are rank feeders when planted outside for their development. The soil should be thoroughly manured with well rotted cow manure before planting. The operation may be performed during April by spreading and forking in the manure. Water should be drained out of the ponds during the winter especially if the walls of the pond are of concrete, to prevent cracking. Another reason for emptying the ponds is to freeze the undesirable aquatic plants, which infest the ponds during the summer, in a similar manner to the weeds of the dry ground.

Insects, Diseases and Enemies

APHIDS are very common enemies during the winter as well as summer, and especially while the plants are in the seedling stage in the greenhouses. During the summer the *Castalia*

group seems the most susceptible the insects appearing upon the leaves, peduncles and the interior of open flowers. Eradication is affected by nicotine spray the percentage to apply being governed by the concentration of the solution. The usual concentration is 40 per cent which is diluted with 400 parts of water. A compressed air spray is used for the work.

LEAF MINER (*Chironomus modestus*) is a pest which is readily recognized by the articulated channels upon the surface of the leaves, the edges becoming discolored. The thick outer leaves of the *Castalia* group are usually visited first. The only remedy consists of removal of the affected leaves and burning them.

LEAF BEETLE (*Galerucella Nymphaea*). This pest is rarely met with in St. Louis but in eastern ponds it causes considerable damage to flowers and leaves, especially the upturned edges of *Victoria regia*. The larva is about three-eighths of an inch in length, ovate in outline, bluish-black above and yellow on the underside. One part of Paris Green mixed with fifty parts of air-slaked lime and applied with a powder gun will eradicate the pest.

HYDROCAMPA PROPRIALIS. This interesting pest delights in making its home in the soft leaves of the *Brachyceras* group. The insect has a peculiar method of travelling from one plant to another. Two triangular portions of the leaf are cut and securely fastened together by means of a web. The least puff of wind will take this self made boat to another portion of the pond until it is caught by another leaf. The pest is difficult to eradicate as the arsenical poisons are not very effective. The surest remedy is to catch the little "boats" and burn them.

ALGAE. Algae in ponds are troublesome pests, usually indicating the struggle for existence between the algae and the water lilies. Gold-fish in quantities will help to control it. A more effective method is the application of copper sulphate at the rate of one to a million parts of water. To make a stock solution take 10 grams of copper sulphate and dissolve in 1000 cc. of water. Use 1 cc. of this solution to 10

cubic feet of water, which strength will not affect the higher forms of plant life nor destroy the gold-fish.

RATS AND MICE. are troublesome during the winter period, being particularly partial to the tubers of the lotus group. Muskrats are troublesome, feeding upon the rhizomes of the hardy lilies and *Nelumbiums* as well as doing damage to the banks of natural ponds. Traps may be used as the means of eradication.

CRAWFISH is chiefly destructive in natural ponds by tunneling and causing leaks. To catch them, nets are used, containing a decoy of a fresh piece of liver, sunk to the bottom and then raised after about one half an hour. Paris green mixed with chopped meat and placed around the waters edge near the exits is also effective.

Nelumbiums

Nelumbium speciosum erroneously called the Egyptian lotus is native of India where it is held sacred by the Hindus. The genus has become naturalized in Egypt being probably introduced by the ancients. At the present time the plants are valued commercially by the Hindoos, Egyptians, Chinese and Japanese. The Rhizomes are used by Chinese and Japanese as a vegetable, being utilized in the same manner as sweet potatoes. The seeds are used in candy making.

The first rhizomes were introduced into this country by Wm. T. Hogg from Japan. They were sent to Isaac Buchanan but did not survive any length of time. Later more plants were shipped by the same man to Mr. Henshaw, which were planted out on Staten Island, N. Y. with success. In 1876 Mr. E. D. Sturtevant of Bordentown, N. J. introduced the *Nelumbium* commercially as a hardy aquatic.* *Nelumbium luteum*, our native species commonly known as the Water Chinquapin, is

* An interesting relic of the introduction of this plant at Bordentown is still found there, where within stone's-throw of the Delaware River there is a large pond covered with the plant. It has "run wild" since its introduction in 1876 and is now thoroughly established. This is its only occurrence in North America so far as known, outside of cultivation.—ED.

also represented in our parks and gardens. The seeds of this species are also edible and are used in the southern states. It is native near St. Louis at Creve Coeur Lake.

Victoria Regia

The discovery of the Giant Water Platter probably dates back to 1801 when the botanist Haenke was sent out by the Spanish government to explore the vegetation of Peru. In 1811 M. Bonpland reported it from Corrientes in Argentine. D'Orbigny also found it at Corrientes as well as Bolivia. Dr. Poepping during his residence in South America from 1827-1833 mentioned it as indigenous to the Amazon River region. Sir Robert Schomburgh discovered it in 1836 in British Guiana and sent specimens to Professor Lindley, who described it and named it in honor of Queen Victoria in 1837. Schomburgh mentions it from various places in South America and repeatedly sent specimens of roots and seeds to England without any results. The successful introduction and cultivation was accomplished at Kew Gardens. John Smith states in his record of the Royal Botanic Gardens:

In August, 1846, seeds of this remarkable water plant were first sent to this country by Mr. Thomas Bridges, a plant collector, who discovered it in Bolivia. Part of these seeds were purchased by Kew, two of which vegetated, and formed leaves the size of a half-crown piece, but on account of their having sprouted late in the season, and our not being acquainted with the true nature of the plant, they both died in the dull weather of November of the same year.

From that time several attempts were made to introduce it, both by roots and seeds, but both arrived dead. In February, 1849, seeds were received sent in a phial of water from Demarara by Dr. Boughton, which vegetated, and in March six plants had become fully established, and grew rapidly, in May one of them filling a shallow tank 9 feet in diameter. Application was now made to the Commissioners of the Woods and Forests for a large tank to grow it in, and accordingly slate sides 2 feet high were put up, forming a tank on the slate floor of an Orchid house. A tank was thus formed 25 feet long by 11 feet wide, and on the 21st of August mould was placed in the center, and a plant planted, which grew rapidly, and on

November 24 produced a flower bud, which, on account of the dull weather of that season of the year did not come to perfection.

A plant having been promised to the Duke of Devonshire early in the spring provided he had a proper tank for it, he quickly had one prepared and on the 3d of August, 1849, our second-sized plant was given to Mr. (afterwards Sir Joseph) Paxton, and the next day planted in his tank. It thus had about three weeks start of Kew, and flowered on the 9th of November. (It next flowered with the Duke of Northumberland at Syon House.)

The plant was kept for three years and formed the nucleus for seed distribution over Europe and this country. Some of these seeds reached Mr. Caleb Cope of Philadelphia in 1851, who flowered one plant just twelve months after it was flowered at Kew. The next plant to flower was in the collection of John Fisk Allen of Salem, Mass. At this period they were grown in especially constructed aquatic greenhouses.

The climate of this country is satisfactory for outside cultivation especially for the hardier form—*Victoria Cruziana*. The plants are perennial in habit but are treated as annuals. The flowers are extremely handsome, nocturnal in habit, white turning to pink and often measuring 15 inches in diameter. The large-platter-like leaves are of unusual interest, measuring between 7 and 8 feet across (in St. Louis) and capable of bearing the weight of a person weighing 150 pounds (see illustration). The thick anastomosing veins are so arranged on the under side as to produce quadrangular compartments or intercellular chambers which are protected with rigid spines. When any weight is applied and equalized over the entire surface the air becomes compressed, easily supporting the weight.

As previously stated this plant under cultivation is treated as an annual. Seeds should be sown in March in sand and placed in heated tanks, the temperature of the water being kept at 90° F. for the *V. regia* and 75–80 for *V. Cruziana*. If the seeds have been thoroughly ripened, they should germinate within three weeks. The seedlings should be potted into sod soil, gradually shifting to larger pots and en-

riching the soil with cow manure. The practice at the Missouri Botanical Garden is to plant the lilies outside in the ponds during the middle of June. Previous planting is not advisable, artificial heat being supplied up to the time that water warms up to 90° F. Before planting the ground should be manured heavily with cow manure. Each plant requires 3 cubic yards of soil, 400 square feet water surface and about 1 foot in depth, for maximum leaf development. The seeds should be collected in the fall by cutting the hedge-hog like pods and placing in the greenhouse to dehisce from their pods and ripen. The water becomes putrid very soon and should be replaced. Two year old seeds will show the greatest percentage of germination. Even three year old seeds that have been left in the pods during winter, protected by water have germinated during July. The radical in some cases reaches six inches in length and indicates that the seeds were buried during the process of spading in of the manure. The seeds are oval, about the size of an ordinary pea and very farinaceous. The natives of South America collect them, dry them and grind them for pastry making.

Euryale ferox

Prior to the introduction of *Victoria regia* this Indian plant was looked upon as a giant water lily. In Bengal the plants are cultivated for their large farinaceous seeds which are still larger than these of *V. regia*. The leaves are round, deep green in color, with numerous convex protuberances on the upper surface, measuring four feet across. The under side is a rich purple color, with prominent veins and spines. The edges do not turn up like those of *V. regia*. The flowers are insignificant, of diurnal habit and deep purple color. The plant is hardy in this locality and as far north as Philadelphia. It is a hardy annual, reseeding itself each year even if the water is drained from the ponds, the frost having no detrimental action upon their vitality. Hundreds of seedlings appear spontaneously each year.

Miscellaneous Aquatics

Under this section the material is unlimited including the submerged, floating and semiaquatic, both native and exotic. Some of the representatives of the submerged types, generate oxygen and are therefore good for fish aquaria. Good examples of these are *Elodea canadensis gigantea*, *Cabomba carolinianum*, *Vallisneria spiralis gigantea* and the seedlings of equitant forms of *Sagittaria*. This material becomes more or less of a pest if planted in the larger ponds with the Nymphaeas. The lace leaf plant *Ouvirandra fenestrata*, native of Madagascar is the most interesting of all the submerged aquatics and is very tender requiring greenhouse treatment. The leaf-blade consists of veins only, all the ordinary material of aquatic leaves being lacking.

Surface plants include those which produce their foliage either on the surface of the water or above and their roots being either floating or permanently attached to the ground. Our native material includes the cat-tails (*Typha latifolia* and *angustifolia*); *Thalia dealbata*, remarkable for its peculiar adaptation to insect pollination. These are suitable objects for planting at the edges of natural ponds. Strictly floating representatives are *Azolla caroliniana* and *Lemna minor*. (Duck weed.)

The tropical representatives are in more demand. The most common of these is the water hyacinth (*Eichhornia speciosa*) which is a rampant grower during the summer, so much so that it chokes up navigation upon the rivers of the south where it has cost the government more to eradicate than any other weed. Another plant is the water lettuce (*Pistia stratiotes*) a member of the Araceae, producing spathe-like flowers from the center, while the leaves assume a rosette of light green pubescence resembling the genus *Lactuca* from which the common name is derived. The floating Gem (*Salvinia natans*) is a very rank grower during the summer, forming a carpet of leaves upon the surface of the water. It makes excellent food for gold fish, which feed upon the roots suspended



JAPANESE WATER GARDEN
ST. LOUIS

in water. The Water Fern (*Ceratopteris thalictroides*) the only fern of truly aquatic habit has two distinct methods of growth. The first stage consists of all the leaves being palmate, lying flat upon the surface of the water and vegetating freely from the sinuses. The second stage shows the leaves fern-like or pinnatifid the edges becoming involute, from which the spores are produced. Another plant which should be represented in all aquatic collections is the Egyptian paper plant (*Cyperus alternifolius*). When planted outside it readily assumes a graceful appearance, the long petioles terminating in mop-like heads of fine grassy leaves, often attaining a height of 10 feet. The pure white pith of the petioles was used by the Egyptians for paper making. All these tropical forms need greenhouse protection in winter as they will not stand the frost.

Missouri Botanical Garden.



NATIVE CAT-TAILS AND
THALIA, MISSOURI BOTANICAL
GARDEN, ST. LOUIS

Tree Surgery

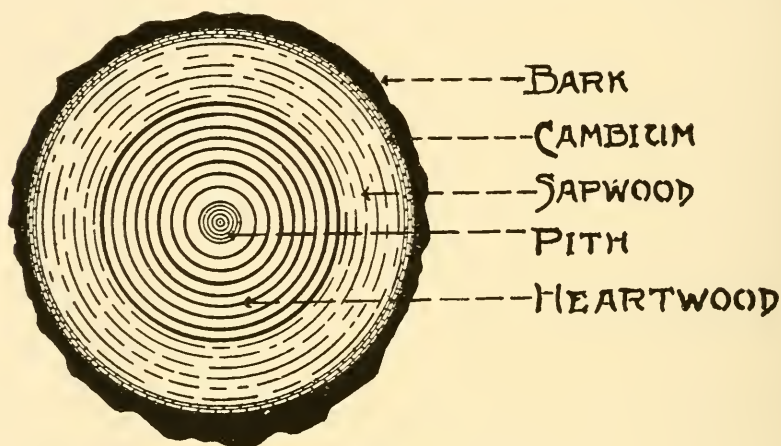
By Alexander Lurie



THE subject of tree surgery is rapidly gaining in importance and popularity, as the people are beginning to appreciate the value of preserving their trees. The importance is somewhat overestimated, for there would be very little need of tree surgery if trees were properly planted, well nourished and cared for during their lifetime. It is seldom realized that trees need fertilization as well as other plants, but the stronger and more vigorous the tree the greater will be its power of resistance to entrance of insects and disease. Maltreatment is common; nails are driven into the bark, wire girdled around the trunk, bark scraped and scarred by lawn mowers, and limbs broken off as if the tree were not a living thing. The object of tree surgery is to remedy this condition of affairs. Its popularity is due to the spectacular effects achieved and the influence of those who shroud the work in mystery and foster the impression that a certain inner communion is necessary between them and the tree to attain successful results. The operations, however, are simple if tree structure, nature of decay and principles of treatment are thoroughly understood.

The trunk of the tree serves the functions of supporting the foliage and acting as a circulation medium between the roots and the leaves. The roots absorb moisture and mineral constituents from the soil, which pass through the trunk up to the leaves in crude liquid form. Through the agency of light and of the green chlorophyll or coloring in the leaves this crude sap is converted into sugar and starch and is then disseminated through all the portions of the tree as the digested sap which is responsible for the nourishment and

consequent growth. The cross section of the trunk shows besides the pith, four separate concentric portions: the heartwood in the center, next the sapwood, then a very thin layer of cambium, and on the outside, the bark. The most important layer from the standpoint of tree surgery is the cambium layer. It is the growing part of the tree, healing wounds, covering cavities and each year laying a thin layer of cells over the entire surface of the tree. It is the cambium layer that conveys all the digested sap through the tree. Next in importance is the sapwood which conveys the crude sap up to the leaves and during winter, together with the roots, acts



SECTION OF TREE TRUNK

as a storage for the dormant food. The heartwood functions as the supporting tissue, although it may help convey some crude sap. The bark is the protective covering for the cambium layer and thus indirectly plays a very important rôle in the life of the tree.

If a broken limb is cut off close to the trunk, the resulting wound is oval and readily shows how the healing will take place. The exposed cambium offers less resistance to the flow of digested sap so that it is accelerated, forcing rapid growth of cells which gradually cover the wounded surface, by rolling over it. It is generally found that the cut heals

most rapidly along the sides, less so at the top and least of all at the base. This is explained by the fact that sap tends to flow in fairly straight lines, hence the greatest flow and growth are past the sides, while the top and bottom receive less. For this reason the narrow wound will heal more rapidly than the square or oval wound running perpendicular to the trunk.

Proper treatment of wounds implies prevention of entrance



CAVITY READY FOR "TINNING"

of fungi and insects and facilitation of healing. In order to prevent the entrance of enemies some protective dressing must be applied. The dressings are divided into two classes: those that disinfect or preserve the wood, killing the spores of the fungi and eggs of insects, and those that fill the wood making it impervious to entrance of parasites.

Under the first head are included: creosote, carbolineum, corrosive sublimate, zinc chloride, copper sulphate, etc., of these creosote and carbolineum are of greatest importance. Both

of these, however, are injurious to the cambium. To avoid killing it back a coat of shellac should be applied first and the coat of the disinfectant next.

The second class includes: pure white lead and linseed oil paint, coal tar, slaters' cement, liquid grafting wax, and asphalt preparations.

Paint and tar are the most commonly used, sometimes with unsatisfactory results, due to the fact that one coat put on



CAVITY "TINNED" AND PAINTED

a fresh wound is not sufficient. Checking takes place as the wood dries out, leaving numerous openings for parasites. This, however, may be readily remedied by applying another coat after checking has taken place. The asphalt preparations are gradually superseding the others, being tough, elastic and quite permanent. They may be both made up, or prepared at home by melting the asphalt and then stirring in a quantity of fluxing oil such as gasoline or linseed oil and

adding some fiber to give it body. Whatever the dressing used, the work should be painstaking and thorough, for it is through the neglect of the wounds that decay begins and borers of all sorts infest the trees.

If these preventive measures have been neglected, and decay has set in, the tree should then be treated to prevent further decay, protected from parasites and strengthened if it is hollow. Before any work is done however, several factors



CAVITY FILLED WITH ASPHALT

should be considered. Is the tree valuable enough to spend a large sum of money repairing it? Is the tree located in a section where an incurable disease, such as Chestnut blight is prevalent? Has the tree reached its maturity? If so it might die off gradually despite repair. Is the tree situated in a grove, where it has no individual effect and where its absence will not be noticed? Has the fertilization, cultivation, watering been attended to properly?

If after considering these points it is still deemed desirable to repair and fill a tree, the proper treatment must be determined upon. The cavities may be filled with concrete, asphalt and other substances, they may be "tinned," and the "open" system may be practiced.

The preliminary steps for all these are similar. The first step is to procure tools for the work, which consist of carpenters' gouges $\frac{3}{4}$ to $1\frac{1}{2}$ inches in width, wooden mallets,



CAVITY FILLED WITH PART ASPHALT, PART "TINNED"

chisels, saw, pruning knife, gasolene torch, ladders, scaffolds, etc. The next step is to excavate thoroughly all the rotten wood, using the gouge or chisel or even the gasolene torch. The mouth of the cavity should be shaped so that it will be wider in than out, to retain the filling; the upper and lower ends should be slanted downward to form water sheds; and the entire opening should have an oval form to facilitate healing. Then the cavity is braced by running $\frac{3}{8}$ to $\frac{3}{4}$ inch

machine bolts from the side of the opening diagonally through the back of the tree. These bolts are inserted every 12 to 18 inches, for the purpose of preventing the filling from cracking from the sides, due to torsional stresses upon the trunk. The hole for the bolt should be bored to be of the same diameter as the bolt, while a square opening should be made in the bark for the nut, deep enough to sink the bolt head under the bark so that it will be eventually grown over. The



IMPROPERLY FILLED, GROWTH OF CALLUS FORCING
OUT THE FILLING

other side has a circular opening to allow for a washer. The cavity and bolts are then creosoted and later fumigated to kill any borers which may be in the sound wood. A teaspoonful of carbon bisulphide is used to every cubic foot of cavity. The entire opening is covered with cloth or tar-paper and a piece of cotton dipped in the solution is dropped into the cavity. If the cloth does not allow the fumes to escape, the borers are killed over night. The cavity is now ready for filling.

The material most commonly used is concrete, either a dry or wet mixture of 1-4. The best Portland cement should be used, coarse sand and $\frac{1}{2}$ inch gravel. No reinforcement is necessary except the bolts, as it will not prevent the cracking which is bound to occur, because of the swaying of the tree. The strengthening effect of the reinforcement is questionable because an inelastic substance like concrete cannot strengthen the elastic wood. The dry mixture is the easier



THE SAME CAVITY PROPERLY EXCAVATED

to use, requiring no form. The concrete should be mixed so that it will not crumble and is then laid in the cavity and brought out to within $\frac{1}{4}$ inch of the cambium layer. It is very important that the filling should be below the cambium to permit it to grow over eventually. The surface of the filling may be gone over with mortar to give it a smooth finish. After drying out a coat of tar or fluxed asphalt is applied to make the concrete waterproof. The "dry" concrete has the disadvantage of disintegrating because of the water grad-

ually leaching out particles of cement. The "wet" concrete method necessitates the use of a form. The form may be made of wood, but that is not economical and necessitates driving nails into the bark. A wire netting may be inserted into the cavity, the concrete poured in and then faced with mortar made of a mixture of cement, lime, sand and water (1 cement—2 lime and sand). Still another method requires the use of oilcloth. Two sticks should be placed on either side of the



BRACING THE CAVITY

opening and tied at the top and bottom by a rope running around the trunk. A piece of oilcloth should then be cut to fit over the opening. It is tacked at the top while the bottom is held in place by soil being banked against it. Beginning at the bottom a strip of canvas should be run from post to post to act as a support for the cloth. When 18 inches from the ground is reached the oilcloth is turned back and into the form the wet concrete (1-4) is poured. Then a piece of newspaper or tarpaper is laid on top to serve as an expansion joint. The canvas

strips are again run up 18 inches and the operation repeated until the cavity is filled. In this method the concrete comes out to the surface of the bark and to avoid that, it is necessary to remove the oilcloth from the tree in three to four hours, cut off the surplus material, bringing it back below the cambium and face the filling with mortar.

Another material which is used for fillings and which bids fair to supersede concrete is asphalt mixed with sawdust or



CAVITY FILLED WITH CONCRETE

excelsior. It is elastic, while concrete is stiff, it adheres to wood perfectly, while concrete does not, it is waterproof while concrete is not. Its one disadvantage is the difficulty of handling. The material comes in the form of little bricks or in bulk. In filling, a wall about two inches thick is built of the asphalt by dipping the bricks into hot asphalt and placing them in the opening of the cavity. As an extra precaution the bricks are nailed to the wood and one to the other.

The cavity behind this wall may be filled with cinders or ashes or asphalt. The wall is kept from bulging out or in by wire "V" shaped braces running from it to the back of the tree. By using a gasoline torch or hot chisel the wall may be smoothed out and all crevices between the bricks filled. The asphalt for fillings may be prepared by stirring sawdust in boiling asphalt, using three parts of sawdust to one of asphalt.

Small cavities may be quickly treated by "tinning." The



TREE IN NEED OF REPAIR

excavation should be similar except that a ledge $\frac{3}{4}$ inch wide and $\frac{1}{4}$ inch below the cambium should be left all around the edge of the opening. A pattern should then be made and the metal fitted. The inside of the cavity as well as the metal are painted and then nailed to the ledge with galvanized nails, placing them one inch apart. Care should be exercised in getting the metal below the cambium layer, otherwise it will be torn off by the pressure of the ingrowing callus. Often the first year the callus will grow over the nails and there will

be no danger of the metal giving in due to the strain of the callus rolling over. If the cavity is long it is advisable to cut the metal into two or three sections, one lapping the other about two inches. The metal is painted over on the outside. Sheet zinc, copper, galvanized iron and sheet iron are all used for the purpose, the tin itself being used least of all, the term "tinning" being generic. The best of the materials is zinc, gauge No. 9.



EXCAVATING AND BURNING OUT THE DECAY

Where appearances do not count, where trees are badly damaged or have irregular cavities difficult to fill, the "open system" may be used. This consists simply of excavating or painting the entire cavity. This method is advantageous because it permits constant observation of the inside of the cavity, while fillings do not; less sound wood is cut, it is quite cheap, and keeps out the fungi and insects quite as effectively as a filling. It has the disadvantage of not having any strength

and of marring the beauty of the tree. This method is finding many advocates.

Bracing is one of the essentials in tree surgery and particularly in prevention of wounds and consequent decay. Limbs require bracing when they are likely to get wrenched from the trunk, when the wood is brittle, when limbs are decayed, when a tree is forked. The old style of bracing consisted of placing an iron band around the limb and connecting it with



CALLUS GROWING OVER THE WOUND

a chain to a similar band around the main trunk. The bands cut into the wood and killed the cambium, thus defeating the very purpose for which they were used. For best results an eye bolt is run through the limb and is connected to another eye bolt, inserted in the trunk, by means of cable rope or iron rods. The cable is rather difficult to work, but after it is up, is the most satisfactory of all braces. In bracing small limbs several strands of galvanized wire should be run through the

two eyebolts, then bound together by a wire and tightened by screwing on the nut of the eye bolt. The eye bolts will vary from $\frac{3}{8}$ to $\frac{3}{4}$ inch depending upon the size of the limb. The braces should be placed as high as possible, for according to the physical law of lever and fulcrum the further from the crotch the two limbs are connected the less strength is required for support. Small trees may have their limbs braced by means of large screw eyes and fence wire, or the wire may be run



CAVITY FILLED WITH CONCRETE SHOWING EXPANSION JOINTS

through an opening in the limb double its diameter, and run back again. A groove should be made at the back of the limb and a nail inserted under the wire to prevent it from slipping out. Many modifications of these methods are employed. For limbs overloaded with fruit a stick with an iron peg at the end is inserted into a hole on the underside of the limb. The stick acts as a prop and if the fit is tight, it will sway with the wind and come down again still supporting the

limb. For limbs that rub, wooden or iron buffers may be used. Two pieces of wood are nailed on to the upper and lower sides of the rubbing branches and in this way keep the two apart. Iron buffers are made "U" shaped out of rod iron.

Missouri Botanical Garden.



(Courtesy American Rose Annual)

JOHN COOK'S UNNAMED AMERICAN SEEDLING ROSE
(FRAU KARL DRUSCHKI \times MRS. CHARLES RUSSELL)

*The Best of the New Introductions for Outdoor Rose-Growing**

By George C. Thomas, Jr.



IN GIVING a list of new roses of most promise, one should understand that new European varieties are shipped to America as such small plants that a two-years test is required. Sometimes these weak plants will not do well until the third year, and when they winter-kill, duplicates must be tested. For these reasons we cannot recommend the growing of new varieties by the average amateur.

During 1915 we have tested all new varieties issued in Europe by prominent growers. Owing to foreign conditions, some 1914 varieties did not reach us until April, 1915, making the tests less conclusive than usual. Roses of 1912-1913 have been thoroughly tested; data regarding them is conclusive.

The color descriptions which follow are, in most cases, the introducer's.

It will be realized that the following descriptions are for the roses as grown near Philadelphia.

* This and the next two articles are reprinted from the 1916 issue of the *American Rose Annual* with the kind permission of the editor, Mr. J. Horace McFarland. Both our colored plates are also from that publication. The coöperation of the American Rose Society which publishes these interesting year-books, will be valuable to the International Garden Club and it is a pleasure to bring to the attention of the members the work of this Society which is doing so much for Roses in America.—ED.

Varieties Introduced in 1912

C. W. COWAN. (Alex. Dickson.) H.T. Good growth, hardy; good foliage, fine stem; medium size, good form, fair lasting qualities; color "warm carmine-cerise," tea-rose perfume; thirty blooms in 1915.

FREIFRAU IDA VON SCHUBERT. (P. Lambert). H.T. Good growth, hardy; fine foliage, good stem; medium size, fair form, lasts well; color "warm crimson-red," delicious perfume; thirty blooms in 1915.

GRANGE COLOMBE. (P. Guillot.) H.T. Good growth, very hardy; good foliage and stem; medium size, form very good, lasts well; color "creamy white with salmon-yellow-fawn center;" fifty-seven blooms in 1915.

LOUISE CATHARINE BRESLAU. (Pernet-Ducher.) H.T. Good growth, hardy; beautiful foliage, lost early, fair stem; medium size, fair form, fair lasting qualities; color distinct "coral-red to shrimp-pink, shaded reddish coppery orange and chrome-yellow;" thirty-three blooms in 1915.

MRS. DAVID BAILLIE. (Hugh Dickson.) H.T. Good growth, very hardy; fair foliage, good stem; spring blooms large, perfect form, lasts well; color "madder-carmine;" fifty-two blooms in 1915.

MRS. HERBERT HAWKSWORTH. (Alex. Dickson.) H.T. Growth good, hardy; good foliage and stem; medium to large size, lasts well; color "ecru on milk-white," tea-rose perfume; thirty blooms in 1915.

OPHELIA. (Wm. Paul.) H.T.* Growth good; fine foliage, stem good; perfect form, lasts well; color beautiful—"salmon-flesh, shaded with rose;" twenty-seven blooms in 1915.

SUNBURST. (Pernet Ducher.) H.T.* A collector's rose. Fair growth, not hardy; beautiful form; color "cadmium-yellow with yellow-orange center;" thirteen blooms in 1915.

Among the *Dwarf Polyanthas* may be noted:

ELLEN POULSEN. (Poulsen.) "Dark brilliant pink."

RÖDHÄTTE. (Poulsen.) "Clear cherry-red."

Varieties Introduced in 1913

ELLI HARTMANN. (Nicola Welter.) H.T. Very good growth, very hardy; good foliage and stem; medium size, blooms well, fair form, lasts well, tea perfume; color "old golden yellow."

KILARNEY QUEEN. H.T. Sport of the well-known Kilarney; slightly brighter, but having same characteristics; thirty-four blooms in 1915.

LADY DUNLEATH. (Alex. Dickson.) H.T. Has improved greatly since 1914. Good growth, hardy; good foliage, fair stem; medium size, blooms well, beautiful in bud form, lasts well; color "ivory-cream-white to egg-yolk;" delicately perfumed.

MADAME CHARLES DUBREUIL. (P. Guillot.) H.T. Strong growth, good foliage and stem; medium size, good form, lasts well; color "salmon-rose, shaded carmine;" thirty-nine blooms, in 1915.

MADAME EDOUARD HERRIOT (Daily Mail). (Pernet-Ducher.) Pernetiana; sometimes listed as a Hybrid Austrian Brier. The greatest novelty; fine growth, very hardy; very beautiful foliage, lost early, stem good; medium size, good form, lasts well; color distinct—"coral-red shaded yellow and bright rosy scarlet, passing to prawn-red;" twenty-five blooms in 1915.

MEVROMW DORA VAN TETS. (M. Leenders.) H.T. Collector's rose. Hardy, fair growth; fair form, shy bloomer; most distinct shade of "deep velvety crimson."

MRS. FORDE. (Alex. Dickson.) H.T. Good growth, very hardy; fair foliage, good stem; medium to large size, blooms well, good form, lasts well, fragrant; color "deep carmine-rose, on delicate rose-pink, clear chrome-yellow at base of petals."

MRS. T. HILLAS. (Pernet Ducher.) H.T. Fair growth, hardy; fair foliage, good stem; medium size, fair bloomer, beautiful form, lasts well; color "chrome-yellow."

PRIMROSE. (Soupert & Notting.) H.T. Fair growth, hardy good foliage and stem; large size, beautiful form, lasts well; color distinct—"melon-yellow during summer, early spring and fall having apricot shadings;" ten blooms in 1915.

QUEEN MARY. (Alex. Dickson.) H.T. A collector's rose. Weak growth; beautiful color—"zoned deep bright canary-yellow, crayoned deep pure carmine," very fragrant; eight blooms in 1915.

WILLOWMERE. (Pernet Ducher.) H.T. Fine growth, hardy; fair foliage, good stem; medium size, beautiful form, lasts well; color "rich shrimp-pink, shaded yellow in center;" twelve blooms in 1915.

The novelties of 1914 which promise best are:

DOLLY VARDEN. (Paul & Son.) H. *Rugosa*. "Light apricot-pink to yellow."

CECILE CUSTERS. (M. Leenders.) H.T. "Lilac-rose to deep rose-pink."

COUNTESS CLANWILLIAM. (Hugh Dickson.) H.T. "Delicate peach pink, edged with deep cherry-red." (See plate, facing page 24.—EDITOR.)

FRAU BERTHA KIESE. (Kiese & Co.) H.T. "Pure golden yellow."

FRAU MATH. NOEHL. (N. Welter.) H.T. "Lemon-yellow."

JOSEPHINE. (Paul & Son.) H.T. "Rosy flesh to salmon-yellow."

KILLARNEY BRILLIANT. H.T. Sport of the well-known Killarney; much darker in color, but having same characteristics.

LADY PLYMOUTH. (Alex. Dickson.) T. "Deep ivory-cream, faintly flushed."

MARGHERITA CROZE. (Ketten Bros.) H.T. "Carmine-purple, changing to purple-rose, shaded deep rose-pink."

MRS. CHARLES REED. (E. J. Hicks.) H.T. "Pale cream, tinted deep peach, to soft golden yellow."

URANIA. (M. H. Walsh.) H.P. "Bright crimson."

WALTHAM SCARLET. (Paul & Son.) H.T. "Crimson-scarlet."

The latest novelties in Climbing Hybrid Teas are *Climbing Richmond* (Alex. Dickson); *Climbing Madame Melanie Soupert* (J. Burrell & Co.); and *Climbing Gruss an Teplitz* (Conard & Jones.)

The newest of the other Climbers are *Mary Lovett*, one of Dr. Van Fleet's seedlings "pearly white;" Walsh's *America*,

"delicate pink shading to white;" and *Purity*, a white climber introduced by Hoopes, Bro. & Thomas Co.

We have tested some few 1915 roses for six months. The most promising are:

JACQUES POSCHER. (Pernet Ducher.) H.T. Light yellow.

MADAME COLETTE MARTINET. (Pernet Ducher.) H.T. "Old-gold-yellow, shaded orange-yellow."

In addition, there are two seedlings of Chateau de Clos Vougeot: *Hoosier Beauty* (Dorner), H.T.; and *Admiral Ward* (Pernet-Ducher), H.T. We hope that the latter will prove as good a dark rose as the well-known Mrs. Aaron Ward has proved a yellow. *Constance* (Pernet Ducher), A.B., has been well recommended.

For two years a number of climbers have been introduced which are claimed to be perpetual bloomers. One of these flowered here—Pemberton's *Moonlight*, giving good June bloom and a number of blooms thereafter; but the foliage mildews; color here pure white; single. Pemberton has also introduced the following as everblooming climbers; *Ceres*, *Galatea*, and *Winter Cheer*. Paul, Leenders and Lambert catalogue new everblooming climbers, which of course are not yet tested.

There are several new men working on hybridization, but Father George Schoener, of Portland, Oregon, is doing splendid work. We trust to see his creations on the market.

Rose Breeding

By E. A. White



IN HIS excellent book on *Roses: Their History, Development, and Cultivation*, the Rev. Joseph H. Pemberton gives a clear and concise analysis of species. In commenting on this table, Mr. Pemberton remarks: "If we examine the table we shall notice two things: (1) the distance removed from the original species of the Hybrid Teas, and (2) that there are many species from which little, if any, advance has been made . . . Does not this fact indicate the wide field still open to hybridists for the production of new roses?"

Until with comparatively recent years, little was known regarding the laws governing heredity in plants, and much yet remains to be learned. In the past, the results which have been attained by hybridists have been largely those of chance. With the re-discovery of the so-called Mendel's laws in 1900, new light was shed on heredity. Since that time hybridists have conducted their work on a more scientific basis, and wonderful results have been attained with some species of plants. Corn, wheat, tomatoes, and other so-called economic crops have been largely experimented with, and the results to the economic world have been beneficial in the extreme.

Less systematic breeding has, however, been done with ornamental plants, with which, therefore, there seems a vast field for investigation and experimentation.

There never was a greater need for breeding work with roses than at the present time. People are demanding novelties in all lines of florists' flowers, but especially is there a demand for unusual varieties of roses. This is especially true regarding those varieties grown under glass, or the "forcing" varieties.



ROSES IN GARDEN OF
MRS. WINTHROP SARGENT
BEACON, N. Y.

In this field, the Bride and Bridesmaid held for many years a dominant place; but with the coming of Killarney in its many colors, the older varieties were no longer grown. There is probably no more popular rose today than Ophelia; yet other varieties are close competitors, and newer types are placed on the market each year. The present popularity of the small cluster roses, like Cecile Brunner, George Elgar and Baby Tausendschön, shows a changed public opinion and the Teas and Hybrid Teas no longer hold non-competitive places in commercial growing.

Many men have realized the need of systematic breeding in the rose family, but few had the perseverance and determination necessary to get results. A few men, however, have given us some desirable varieties of roses, and to these men present-day rosarians owe much. There is a demand for species of roses adapted to American conditions, and these must necessarily be American bred. The soil and climatic conditions in European countries are quite different from those in America, wherefore many of the species originated in Europe are unsuited for use in this country. We need strains of American roses which correspond to the type of the American carnation.

More breeding work has been done in America on varieties of hardy roses than on the types grown under glass. *Rosa Wichuraiana* and *Rosa rugosa* have, within recent years, furnished a starting point for breeding experiments which have been a pronounced success. There is still a demand for improved varieties in these groups, but there is even a greater demand for improvement in those varieties which are "forced" under glass.

Breeders of roses certainly have many difficulties to solve. The family is a large one, and contains many species. Among these species there already exists a large number of hybrids, and the blood is so mixed that it is difficult to begin with pure blood of any particular species.

The science of genetics is based on heredity, and while environment and training influence the development of an individual, heritage or "blood" is largely responsible for the traits

of character most prominent. Early studies of plant-breeding were based largely on a study of individual plants. It has been within recent years that interest has arisen in unit characters in individual plants and animals; but with the realization that these characters do occur in all individuals to a greater or less degree, and that they are transmitted to offspring in a rather definite ratio, there has arisen a clearer conception of methods for reproducing desirable characters in the offspring.

It has been stated that in breeding roses there is much complexity. There are many unit-characters which must be transmitted to the offspring, and therefore simplicity of action is impossible. Among these unit-characters are color, fragrance, size of flower, substance of petals, strength of stem, resistance to disease, character of foliage, and hardiness. To combine all these desirable qualities in one individual requires most careful selection of parents and painstaking breeding, which must necessarily extend over a considerable period of years. The color factor alone is exceedingly complex, as is shown in a most carefully prepared paper on "*Heredity of Color in Phlox Drummondii*", by Dr. A. W. Gilbert, Department of Plant Breeding, at Cornell University, and published in the *Journal of Agricultural Research*, July 15, 1915. The general principles which govern heredity of color in phlox govern color in roses, although their application is much more complex in the latter case.

The rose is, therefore, not an easy plant to breed and get marked improved results. The period of "watching and waiting" is a long one. In other words, it is not a plant of "frequent generations" as are many other species of ornamental plants. After the parents have been crossed, it takes a long time for the seedpods to mature, and after the seeds have ripened they are difficult to germinate. It requires the most careful treatment to get even a fair percentage of germination. The blooming period of the offspring does not follow quickly, and the hybridist has to wait a long period for results. Even when the work has been carried out along modern scientific lines and careful attention has been paid to all principles of genetics, the results are often discouraging.

However, our American men of science are awakening to the possibilities which lie in the rose family, and the future of this plant is promising. Plant-breeders have found corn and wheat wonderfully plastic under scientific development, and the belief is strong that the rose may, in the near future, be developed into types far superior to those of today.



(Courtesy American Rose Annual)

FRED H. HOWARD'S NEW AMERICAN
ROSE LOS ANGELES

Possibilities in the Production of American Garden Roses

By Walter Van Fleet



ROSE-BREEDING now, as in the past, progresses quite exclusively along commercial lines. The aim of most raisers of seedling roses, here and abroad, appears to be the prompt production of compact-growing and constant-blooming varieties, suitable for the production of cut blooms under glass or in the garden. Introduction of new roses of the Hybrid Tea, Tea, and dwarf Bourbon types suitable for glass-house culture or garden bedding in 1912 numbered ninety-nine, as against thirty-seven in all other classes combined. The following year the disproportion was even greater. The seasons of 1914 and 1915, from best information, would have shown further proportionate increase of the everblooming types if the deplorable war situation in Europe had not interfered.

This is all good work. Many splendid and highly useful varieties have been developed that will long beautify our greenhouses and gardens, providing large revenues for the florist and nurseryman as well. The great value of such roses as General MacArthur, Richmond, Radiance, My Maryland, Killarney, and the gorgeously tinted Pernetianas, appealing in the highest degree alike to growers and flower-lovers, is not to be depreciated. They are precious acquisitions, but it cannot well be denied that continuous-blooming roses, with their strong infusion of tender Oriental blood, are, with very few exceptions, children of exacting cultural conditions and cannot generally be relied on as home-yard plants.

More easily managed varieties than are now available,

suit for common dooryard culture under the diverse climatic conditions of our broad country, are needed. For securing diversity of type as well as excellence of bloom, all available vigorous species of pleasing aspect, and their strong-growing garden forms, should be utilized, crossing and blending them together and with highly developed florists' varieties, in the hope that in some of the progeny will be combined the really desirable characters of the parent. This work should be widely carried out in all parts of our greatly diversified country, particular attention being paid to the raising of seedlings from species or varieties naturally adapted to the location.

The first American rose hybrids to gain recognition were probably the beautiful Noisette climbers raised in Charleston, S. C., as early as 1816. They are combinations of the everblooming Chinese rose and *Rosa moschata*, the wild musk rose of the Himalaya Mountains. Whether produced by intentional or natural hybridization, the introduction of this free-growing decorative type, which has since reached its highest development in the incomparable golden-flowered Marechal Niel, reflects high credit on the originators. In 1830, Harrison's Yellow, absolutely indispensable for dooryard adornment throughout practically our whole country, was sent out from a New York nursery. It bears evidence of admixture between the Asiatic *Rosa lutea* and the Scotch rose, *R. spinosissima*, and is the only form of the bright yellow *Rosa lutea* thoroughly at home in our climate.

The Queen of the Prairies type of climber, formerly planted in great numbers but now superseded by the new *Wichuraiana* and *multiflora* ramblers, was produced, it is well known, about the year 1843 by Samuel Feast, a Baltimore nurseryman. The wild Michigan or Prairie rose, *R. setigera*, is plainly the dominant parent, and the perfume rose of southern Europe, *R. dallica*, is assigned as the other factor, though the progeny, like the native *setigera*, is scentless. Baltimore Belle is thought to have had a Noisette Rambler as the pollen parent.

Hitherto there is little evidence of intentional breeding work, in the modern sense, among rose-growers. Superior seed-

lings or mutations of chance origin were propagated when observed and disseminated by nurserymen. Rose-breeding for the avowed purpose of developing new varieties adapted to the needs of the country may be said to have been initiated by the late H. B. Ellwanger, of Rochester, N. Y., writer of one of the best rose books ever published. He worked with the best varieties and species that came to his hand, and made an especial effort to inject diversified blood into Queen of the Prairie and other of the Feast climbers, but they proved then, as since, sterile, refusing to produce seeds or fertile pollen under all available conditions. Marshall P. Wilder, a seedling of General Jacqueminot, introduced in 1884, is the best known of Mr. Ellwanger's productions and is a most excellent garden rose.

Few notable results appear to have been accomplished by American rose-breeders after Mr. Ellwanger's efforts until the closing years of the past century, when the general dissemination of the hardy and vigorous Asiatic species, *Rosa rugosa*, *R. multiflora*, and *R. Wichuraiana*, suggested new possibilities of combination with existing successful types. The rugosa rose appears to have been first used in this country by E. S. Carman in New Jersey and J. L. Budd in Minnesota, though Jackson Dawson, of the Arnold Arboretum, produced hybrid seedlings as early as 1892. Few of these early crosses have been widely cultivated, Agnes Emily Carman, progeny of rugosa pollinated with Harrison's Yellow, and the Arnold and Ames roses, both rugosa and "Jack" crosses, being best known.

Rosa multiflora and *R. Wichuraiana* next received attention, the first at the hands of Jackson Dawson, resulting in the well-known Dawson climber (*multiflora* × Jacqueminot), and others. The first hybrids of *R. Wichuraiana* given to the public were sent out by W. A. Manda, of New Jersey. The variety Gardenia (*Wichuraiana* × Perle des Jardins), often termed the "hardy Marechal Niel," never has been superseded and is still widely grown. The work was taken up by M. H. Walsh, of Massachusetts; Jackson Dawson; James A.

Farrell, of Pennsylvania, and others, the appearance at this time of the superior climbing form of *multiflora*, known as Crimson Rambler, lending new interest to the production of tall-growing roses.

The writer's experience in raising hybrid seedlings from various rose species has convinced him of the great desirability of disseminating information—none too plentiful—of the breeding characteristics of native and Old World rose species, in order that efforts for their utilization may not be too greatly duplicated. Much has been done with a few of the rugged and free growing natural types, but the surface of rose-breeding for American home-yard adornment has barely been scratched. A brief review of the most promising species for immediate efforts may be in order, taking first those native to or already well disseminated in North America.

Rosa rugosa must be regarded as of first importance. While it appears to be found naturally growing only in Japan and eastern Siberia, it is at home wherever planted in the United States and Canada. The plant endures great heat and is scarcely destructible by cold, but the blooms are more lasting and better appreciated in northern latitudes. Rugosa varieties and hybrids bid fair to become the most reliable and highly prized bush roses for the northern and Prairie States, and, when the choicer forms are known, to be valued far down toward the frostless regions. Rugosa hybrids, as a rule, carry their vigor, beauty of foliage, frost- and disease-resistance well into the third and fourth dilution with Tea and Remontant blood, while gaining greatly in beauty of bloom and coloring; but the faults of excessive spininess and weak flower stems also persist; and the rugosa type may be regarded as especially adapted for the garden and not likely to produce varieties having value for cutting and exhibition.

The rugosa type has been hybridized with almost all the cultivated species and with many of the garden forms, resulting in a considerable number of varieties of great botanical interest and not a few of considerable garden beauty. Apparently not much more is to be expected from primary crosses

except as a starting-point with newly found species, but the hybrids should be extensively used whenever they prove fertile, which is very rarely the case among those bearing double flowers. The most reliable of the latter are *Delicata*, pink; *Germanica*, deep red; and *Souv. de Pierre Leperdreiux*, crimson. Double white-flowered *rugosas*, in my experience, rarely fruit, and if seeds are occasionally produced they germinate feebly, if at all. The single white variety, however, seeds freely when properly fertilized with good pollen from double roses, and the resulting progeny usually shows a fair percentage of plants with well-formed double blooms, fragrant and freely produced. The work of building up acceptable *rugosa* varieties, it must be admitted, is excessively slow—one must be content with the prospect of one or two real successes in a lifetime of effort.

Rosa Wichuraiana, on the other hand, gives quick and generous response to all well-considered breeding efforts. Most of the charming new rambling varieties, now so plentifully grown, are the direct result of pollinating the type of natural wild form of *Wichuraiana* with the best garden roses, including *Teas*, *Hybrid Teas* and *Remontants*. So susceptible is this oriental species to foreign pollen that if grown near other varieties blooming at the same time it rarely reproduces itself from seed. No other species so richly rewards the breeder impatient for results, but its ease of manipulation has rather flooded the market with varieties lacking distinctiveness.

What the rose-loving public now demands is large-flowered *Wichuraiana* climbers of varied coloring, having blooms approaching the size and finish of the indoor and exhibition varieties, but with the vigor and foliage advantages of the type and earlier hybrids. To secure these qualities it appears necessary to use as seed-producers *Wichuraiana* hybrids resembling the type, but one or more removes from the wild form.

Thus the climber, *Dr. W. Van Fleet*, was raised from seeds of a *Wichuraiana* × *Safrano* seedling (showing little of the

tea-scented pollen-parent except in reddish shoots and longer stamens), pollinated with Souv. du Pres. Carnot. The result practically places the highly-finished Carnot blooms on a rampant hardy climber, from which buds with 18-inch stems may be cut by the armful in its season of bloom.

Silver Moon is the offspring of Cherokee rose pollen on the stigmas of a cross between *Wichuraiana* and *Devoniensis*, the latter a strong-growing Tea rose, possibly having traces of the Indian *Rosa gigantea* in its composition. This hybrid differed from *R. Wichuraiana* only in its fewer large blooms produced late in the season, and the very sparing way in which it fruited. *Wichuraiana* hybrids of the better class are rarely fertile, and often tend to dwarfness in their seedlings, when they can be bred at all. A race of everblooming *Wichuraiana* of bushy growth will no doubt be eventually developed.

Rosa multiflora in its typical form does not promise much, but the progeny of Crimson Rambler and the charming dwarf Polyanthas offer fine grounds for future breeding work. The weakness of this type is the susceptibility of the foliage to many varieties of mildew.

Rosa lutea (Harrison's Yellow). Reference has already been made to this charming variety. The pollen has been quite extensively used on *R. rugosa* and other species, but thus far has given little result except in the production of the dark crimson Rugosa hybrid, Agnes Emily Carman. I have raised some very attractive yellow and coppery flowered crosses of Harrison with *rugosa alba*, but only disappointment has followed its use with other varieties. Plants of Harrison's Yellow in dry situations occasionally seed with some freedom; but, although many hundreds of chance or self-fertilized seeds have been sown, I have never known one to germinate, and have never been able to secure seeds by pollinating its blooms from other roses, though as many as 600 trials have been made in a season. All seeds produced by this fine old variety should be planted in the hope that some will grow and in time help to solve the riddle of its origin.

Seeds of other forms of *R. lutea*, such as Persian Yellow,

Austrian Copper, etc., are quite as refractory, none germinating under my observation. Persian Yellow is, however, the pollen parent of Lord Penzance, one of the best of the Sweetbrier hybrids, and also through Soleil d'Or, is the dominant parent of the new Pernetiana race. It may well be used in this country.

Rosa bracteata (Macartney). This beautiful white-flowered climber, native of eastern Asia, but fairly well established in the South, has been used very little for breeding purposes. But few varieties are known, the chief one, Maria Leonida, not always expanding its blooms. It is usually termed a tender species, but is quite hardy at Washington, D. C. I have found it to seed freely when pollinated with many varieties and other species. The few crosses that have bloomed include a lovely pink-flowered hybrid with *Rosa carolina*, with extremely longpointed buds; and a fragrant, double-flowered, pure white variety of bushy form, the result of using pollen of the scentless Frau Karl Druschki. *R. bracteata* promises well for the production of varieties suited to at least the South.

Rosa laevigata (Cherokee). Though long considered a native, the Cherokee rose is now believed to have originally been imported from China or Formosa. It is widely naturalized in the South, extending on the banks of irrigating canals far into Texas. Where it is sufficiently hardy to bloom well it is highly prized for its large and beautiful white blooms and shining deep green foliage. Countless attempts have been made to blend it with the choicer garden roses, but failure has been so constant that Cherokee rose-breeding has been pronounced impracticable. The writer has squandered whole seasons of work on the Cherokee, and has little to show for it except Silver Moon and a bushy seedling producing apple-blossom-pink, semi-double blooms, of exquisite fragrance but of little garden value. Scores of hybrid offspring of the choicest parentage have been grown from this species only to perish before flowering, often without divesting themselves of immature foliage. A hybrid, Cherokee \times Marechal Niel, promised much at the outset, repeatedly sending up shoots

8 to 10 feet high, only to have the juvenile-looking foliage fall before full development, and the shoots wither away. This variety was grown in the greenhouse and outside, on its own roots, budded on both parents and other stocks, in the East, and was also well established in a favorable location in California; but it perished after four years of trial without developing a bloom. The Cherokee rose, like Harrison's Yellow, is indeed a hard nut for the rose-breeder to crack; yet it has developed varieties of value like Anemone, a lovely pink-flowered form, thought to have an infusion of Tea-rose blood; and efforts to blend it with other types should not be abandoned.

Rosa rubiginosa (Sweetbrier) and *R. canina* (Dog rose). The pleasing results obtained by the late Lord Penzance by crossing in England the Eglantine or wild Sweetbrier rose with various garden roses is known to all in the form of Penzance hybrids, charming as hedge or dooryard roses, with their bright-colored blooms and scented foliage. Trials in this country, however, have not added new varieties comparable to those produced abroad, and the same may be said of the Dog rose, now used in hybridization to some extent abroad. Both species have foliage very susceptible to fungous troubles in our climate, and have hitherto failed to give good results, when used for breeding purposes. Many indifferent forms of the Sweetbrier of the *Rosa agrestis* type, with foliage of faint odor or altogether scentless, abound here and care should be taken to secure the true *R. rubiginosa* if it is desired to use the species.

Rosa setigera, the Prairie rose. This valuable native should be used freely where hardiness and vigor are especially desired. Although the Samuel Feast seedlings have never been changed by the efforts of breeders, the type remains to be worked with, and promises well when combined with free-growing Asiatic species. American Pillar, which has won wide popularity here and abroad, came from a *Wichuraiana* × *setigera* hybrid, pollinated with a bright red Remontant rose. Not all crosses with *setigera*, however, are good. When the species was bred

with Hybrid Teas, the result was a number of exceedingly bright-colored varieties with thin unattractive foliage.

Rosa carolina. This tall and vigorous native of our eastern lowlands without doubt has possibilities of a high order. The long-budded hybrid with the Macartney rose, referred to, appears desirable. Other cross-bred seedlings are on the way.

Rosa californica. This promising species may be regarded as the Pacific Coast representative of *R. carolina*, though there are some rather important botanical and horticultural differences. The large panicles of pale pink flowers are borne through a long season, and there appears to be a decided tendency toward doubling of the blooms and the production of autumn inflorescence when grown in the East under good cultural conditions. *R. californica* has been hybridized with *R. rugosa* in Europe, and readily accepts the pollen of other species and varieties. I have cross-bred seedlings of this species under way.

Other native species. With the exceptions above noted I have found most native species intractable to hybridization, seldom producing sound seeds under controlled pollination, and showing little change of type even when hybrids have been produced. *R. virginiana*, *R. blanda*, *R. Fendleri*, *R. Woodsii*, *R. humilis*, *R. Sayi*, *R. nitida*, and others have repeatedly been tried without encouraging results, the efforts extending over twenty years. Most of these species will cross with *Rosa rugosa*, but except for botanical collections the immediate progeny is seldom worth growing, and the succeeding generations of self-or cross-pollinated seedlings show little change. *Rosa virginiana* and others, however, have given rise to charming double and white-flowered mutations under varied cultural conditions, and should not be neglected. The delightful fragrance of many species of this group is an encouragement, as also their entire adaptability to climatic conditions. There are some other native species of promise that do not appear to have been used for the production of new varieties.

New exotic species. Some very beautiful rose species of

great breeding interest have been discovered of late years, mainly in central and western China, and are slowly being introduced to American and European cultivation. At present, the most promising are:

Rosa Soulieana. An extremely vigorous species of *multiflora* type, less hardy in wood but with far more resistant foliage and larger blooms, very plentifully produced. Some botanical specimens of *R. Soulieana* show light yellow flowers, but those available in this country are of the white-flowered type. *R. Soulieana* appears to be quite as readily hybridized as *R. Wichuraiana* and may confidently be expected to produce varieties of interest. The only seedlings yet bloomed, with Cabbage or *Rosa centifolia* varieties as pollen parents, have delightful semi-double blooms, shell-pink and light crimson in color, fragrant and beautifully formed. The hybrid plants are rampant in growth, with very spiny stems, and preserve the resistant foliage of the species. The cross with *Rosa setigera*, as yet unbloomed, is especially vigorous.

Rosa Hugonis and *R. xanthina* are early-blooming, yellow-flowered species of great promise as ornamental shrubs for door-yard embellishment in this country in their natural state, and should be capable of developing varieties of even greater attractiveness. There is some confusion between the two forms as introduced to cultivation here, but the one known as *R. Hugonis* appears to afford the better opportunities for breeding, as it seeds with great freedom and appears to hybridize readily with other wild and cultivated roses. Seedlings of *Hugonis* \times *rugosa*, white variety, and *Rosa altaica*, are the first to bloom, to both of which it has imparted much of its yellow coloring. *R. xanthina* has given plants with double yellow blooms from collected seeds, but as yet does not fruit well here; more fertile forms may in time be imported. The seeds of *R. Hugonis* are very slow in germination, only a few coming up within two years. As the ungerminated ones appear sound, some may eventually grow.

Rosa Moyesi and *R. Fargesii* are two beautiful Chinese species of the *R. macrophylla* type, little known in this coun-



ROSA HUGONIS
FLOWERS CLEAR YELLOW

(Courtesy American Rose Annual)

try. They are strong growers when established on their own roots, quite hardy, and produce showy blooms of great substance, deep brownish red in color. *R. Fargesii* has the darker flowers, but both are exceedingly attractive, and if they will "nick" with improved garden roses, very distinct varieties may result. I have not heard of either species fruiting here, but the pollen has been used here and abroad, apparently with good results.

Rosa setipoda is also an unusually attractive species, with nearly spineless branches, fine large resistant foliage and large clusters of lively pink blooms. Like the preceding species, it has not yet fruited under my observation, but the pollen appears effective on other species and garden varieties. It should impart good characters to its hybrids if they are successfully produced.

Rosa Willmottiae has a very distinct and pleasing appearance when in bloom. The bright pink blossoms are freely produced in graceful sprays very early in the season, but the pretty foliage does not well endure our summer conditions, falling an early prey to "black spot" and other fungous troubles. It fruits sparingly, and the pollen is effective at least on *R. rugosa* and *R. setigera*, but the foliage weakness is so pronounced that little can be expected from hybrids in our climate.

Rosa sertata and *R. floribunda* are Chinese novelties, highly praised from the European standpoint, but their utility for the Western hemisphere has not yet been tested. *R. sertata* is an excellent grower in Washington, D. C., and is said in effect to be a very superior wild rose of the *R. Willmottiae* type.

The list of hopeful species is far from being exhausted. Only the most prominent have been mentioned. New species and highly important local types are constantly brought forward. The era of intelligent rose-breeding for outdoor effects has scarcely dawned, and the wealth of material at hand suggests the widest use by patient and hopeful workers.

Plant Immigrants

The Office of Foreign Seed and Plant Introduction of the Bureau of Plant Industry publishes a list, under the above name, of recently imported plants, many of which are valuable to the gardener, from a decorative or economic standpoint. Through the courtesy of Mr. David Fairchild, who is in charge of this work, we are enabled to reprint notes on such plants as have particular interest to our readers. To all who can demonstrate their fitness to care for these recent introductions, the Office of Foreign Seed and Plant Introduction will send what is available. Recipients of such material, which often requires considerable skill in handling, obligate themselves to report, when requested, as to what the result of their observations has been. It is essential that the numbers assigned by the Office should be firmly attached to the plant. By this the government gets data on hardiness of the new introductions, and the growers have an opportunity for the observation, first hand, of plants that may prove important. Applications for or letters about these plants should not be sent to the Editor but to Mr. David Fairchild, Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry, Washington, D. C.



ESCHYNOMENE sp. 44113. Seeds from El Coyolar, Costa Rica. Presented by Mr. Carlos Wercklé. *Yellow sensitiva*. An annual, papilionaceous, dense-growing, nearly trailing plant, finely and densely ramified, resembling the sensitive *Mimosa*; our best plant for enriching the soil. Said to be a good forage plant. (Wercklé.)

AMARANTHUS PANICULATUS L. (Amaranthaceae.) 44176. Seeds of an *amaranth* from India, secured from Kashmir. A tall, handsome plant 4 to 6 feet high, cultivated in eastern and western Asia and Africa. The lance-elliptic leaves are 2 to 6 inches long, and the numerous flowers are borne in dense red gold-colored spikes. The subglobose seeds are white, red or black, and because of their farinaceous nature form the staple food of the poorer classes of the hill tribes in many parts of India, where the plant is known as *Rajgira*.

AMYGDALUS NANA × PERSICA (Amygdalaceae.) 44177. Bud wood of a *hybrid peach* from Excelsior, Minn. A hybrid be-

tween *Amygdalus nana* and the Bokhara No. 3 peach. This hybrid grows to about 8 feet on *Prunus americana* stock, is perfectly hardy and is the best bloomer in the spring of all stone fruits. The tree produces an abundance of pink blossoms, larger than those of *Amygdalus nana*, but it has never borne any fruit. The foliage is glossy dark green and stays on until the frost gets it in the fall.

CASTANEA MOLLISSIMA Blume. (Fagaceae.) 44197-98. Seeds of a *chestnut* from China. Collected by Mr. Frank N. Meyer, Agricultural Explorer. This Chinese chestnut has shown itself so resistant to the chestnut blight disease that Mr. Meyer has secured additional quantities from the Pangshan district, northeast of Peking.

DAVIDIA INVOLUCRATA VILMORINIANA (Dode) Hemsley. (Cornaceae.) 44127. Seeds from Paris, France. A tree, 40 to 50 feet high, from western China; with alternate, bright green, ovate, coarsely serrate leaves, 2 to 4½ inches long; inconspicuous flowers in terminal, globular heads, about an inch in diameter; enormous white bracts surrounding the flowers; and ovoid, greenish yellow fruits with brown dots, about 1¾ inches long. In the British Isles this tree is quite hardy, and though it can be propagated by cuttings, the plants raised from seeds show the greatest vigor.

FAGOPYRUM VULGARE Hill. (Polygonaceae.) 44208. *Buckwheat* seeds from Malanyü, Chihli province, China. Collected by Mr. Frank N. Meyer, November 25, 1916. *Ch'iao mai*, meaning "Triangular wheat." Chinese buckwheat grown as late crop on poor lands and on mountain slopes. From the flour a very thin and brittle vermicelli is manufactured, from which a meal can be prepared within a few minutes.

JUGLANS MANDSCHURICA Maxim. (Juglandaceae.) 44233. Seeds of *Manchurian walnut* from Shinglungshan, Chihli province, China. Collected by Mr. Frank N. Meyer, December 3,

1916. *Shan ho t'ao*, meaning "Mountain or wild walnut," occurring in Manchuria and Northern China, growing into a stately tree. The nuts are small and contain but little meat, but they are eagerly eaten by the people. The young foliage is very sensitive to frosts, and the tree can be grown successfully only in such localities where late frosts are of rare occurrence. Of value as a hardy shade tree; possibly also as a stock for Persian walnuts, in cold localities.

JUGLANS REGIA L. (Juglandaceae.) 44199-44200. *Walnut* seeds from Peking, China. Collected by Mr. Frank N. Meyer, November 10, 1916. Walnuts of large size, said to come from the mountains west of Peking. Chinese walnuts seem especially adapted to semiarid regions with warm summers and dry cold winters.

JUNIPERUS CHINENSIS L. (Pinaceae.) 44234. *Juniper* seeds from Peking, China. Collected by Mr. Frank N. Meyer, December 27, 1916. *Pai shu*. Berries of the North Chinese juniper, a hardy, drought and alkali-resistant evergreen tree, living to be many centuries old. Especially suited for dry climates with winters not too severe.

PHASEOLUS ANGULARIS (Willd.) W. F. Wight. (Fabaceae.) 44232. *Adzuki beans* from Malanyü, Chihli province, China. Collected by Mr. Frank N. Meyer, November 25, 1916. *Hei hsiao tou* meaning "Black small bean." An adzuki bean of marbled, blackish color, used mostly to produce first quality beansprouts. These beansprouts can be produced by putting the beans in an earthen crock well drained by means of holes in its bottom and keeping them moist until they sprout and produce roots $1\frac{1}{2}$ inches long. These sprouted adzuki beans when blanched by immersion for a few minutes in boiling water, and cooling in cold water make a delicious vegetable, when fried in butter until they begin to brown.

PERILLA FRUTESCENS (L.) Britton. (Menthaceae.) 44205. Seeds from Malanyü, Chihli province, China. Collected by

Mr. Frank N. Meyer, November 25, 1916. *Su tzu*. An odoriferous annual, the seeds of which contain a great percentage of oil which is used in waterproofing paper and cloth. They are also fed to song birds in winter time. The young tops are employed in giving flavor to certain pickles.

PICEA MEYERI Rehder and Wilson. (Pinaceae.) 44149. *Spruce* seeds from Shinglungshan, Chihli province, China. Collected by Mr. Frank N. Meyer, December 3, 1916. "A tall-growing spruce, often having bluish needles." (Meyer.)

PYRUS LINDLEYI Rehder. (Malaceae.) 44164-44168-44170-44174. Seeds and cuttings of *Chinese pears* from China. Collected by Mr. Frank N. Meyer. Among these are some of the best cultivated pears of northern China; most of them excellent keepers and all of value in breeding experiments.

PYRUS USSURIENSIS Maxim. (Malaceae.) 44151-44163. *Pear* seeds from Malanyü, Chihli province, China. Collected by Mr. Frank N. Meyer. *Suan li*, meaning "Sour pear." A medium-sized Chinese pear, of globose form and of green color. Calyx persistent, length of peduncles varies considerably in different specimens. Flesh somewhat gritty and quite sour. These pears cannot be eaten raw, except after having been frozen, when they become melting. By cooking them, however, a sour sauce can be obtained which missionaries found acceptable as a substitute for sour apple sauce. Possibly these may also prove to be blight-resistant.

CALLICARPA GIRALDIANA Hesse. (Verbenaceae.) 44076. Cuttings from Jamaica Plain, Mass. Presented by the Arnold Arboretum. An ornamental shrub from western China, with dentate leaves 2 to 4 inches long, dense cymes of pink flowers on hairy stalks, and violet fruits. If sheltered this shrub will grow in the northern parts of the United States, and if killed to the ground, young shoots will spring up vigorously, producing flowers and fruit in the same season.

CASTILLEJA INDIVISA Engelm. (Scrophulariaceae.) 43985. Plants grown at the Plant Introduction Field Station, Chico, California, from seed collected by Dr. David Griffiths, of this Bureau, at Lyford, Texas, May 2, 1915. "One of the most showy of the winter annuals of southern Texas. The seedlings come up very abundantly upon the sandy coastal plain in autumn, developing slowly during the winter but rapidly in early spring, and dominating the color of acres of the landscape in late March and early April. Here its seeds are matured in late April and early May. There are few native plants more showy than this one. This whole group of painted cups, however, are considered somewhat difficult to grow, and are consequently little handled in the trade in this country, although commonly grown in England. Our efforts have met with success and failure in their handling. Recent trials indicate that the habits of the plant, as depicted above, should stand winter handling, and that they can be grown successfully as winter annuals in regions having mild winters with sufficient moisture for seed germination in autumn. It requires a comparatively low temperature for their development, experience at Chico, California, showing that the sudden transition from winter to summer, such as we have, dwarfs the plant before maturity, so that they produce but few of the colored bracts which are so attractive in all of the painted cups or Indian paint brushes." (Griffiths.)

COTONEASTER DIVARICATA Rehder & Wilson. (Malaceae.) 43991. Seeds from Jamaica Plain, Mass. Presented by the Arnold Arboretum. A deciduous upright shrub from central and western China, with shining oval leaves $\frac{1}{3}$ to $\frac{3}{4}$ inch long. The pink flowers are usually in threes, and the bright red fruit, containing 2 stones, is $\frac{1}{3}$ inch long. A very handsome shrub when studded with its bright red fruits, and hardy at the Arnold Arboretum.

COTONEASTER HORIZONTALIS PERPUSILLA Schneider. (Malaceae.) 43992. Seeds from Jamaica Plain, Mass. Presented

by the Arnold Arboretum. A low Chinese shrub of prostrate habit with almost horizontal branches in two dense series and roundish oval leaves less than $\frac{1}{3}$ inch long. The flowers are erect, pink, and either solitary or in pairs, and the bright red oval fruit, $\frac{1}{4}$ inch in diameter, usually contains 3 stones. One of the most effective fruiting shrubs for rockeries.

COTONEASTER HUPEHENSIS Rehder & Wilson. (Malaceae.) 44079. Cuttings from Jamaica Plain, Mass. Presented by the Arnold Arboretum. A shrub, native of central and western China, up to 5 feet in height, with slender spreading branches oval or elliptic leaves with gray wool on the lower surfaces, 6 to 12 white flowers in each of the numerous cymes, and red, nearly globular fruits about $\frac{1}{3}$ inch in diameter. This is one of the handsomest of Cotoneasters in bloom, and is hardy as far north as Massachusetts.

COTONEASTER TENUIPES Rehder & Wilson. (Malaceae.) 43995. Seeds from Jamaica Plain, Mass. Presented by the Arnold Arboretum. A gracefully-branched, deciduous shrub, from western China, up to 7 feet high, with oval or elliptic-oval, sharp-pointed leaves, about $1\frac{3}{8}$ inches long. The flowers are unknown as yet, but the fruits are nearly black, usually solitary, and contains 2 stones.

DAHLIA IMPERIALIS Roezl. (Asteraceae.) 43981. Cuttings of *dahlia* from Tactic, Depto. de Alta Verapaz, Guatemala. Collected by Mr. Wilson Popenoe, Agricultural Explorer. Double white variety. The pink tree Dahlia is common throughout a large part of Guatemala. I have seen it from Antigua to Coban often in great abundance, its huge single pink flowers, 4 inches in diameter, making it a very striking thing. The pink form, which apparently is the typical one, is the only form which I have seen in the southern part of Guatemala, but in the vicinity of Tactic there are three other forms. None of these is so common as the pink form, but all are seen occasionally in gardens. The forms in question are: a single white, identical

with the typical single pink except in its color, which is pure white; a double pink, of the same lilac pink shade as the typical form but with double flowers, 3 inches in diameter; and a double white form, of the same character as the double pink but with double flowers, 3 inches in diameter; and a double white form, of the same character as the double pink but pure white. The tree dahlia is called *shikar* in the Pokomchi dialect, which is the language of the Indians at Tactic. It is very commonly planted around gardens and dooryards to form a hedge; large cuttings, 3 to 4 feet long and of stems 1 to 2 inches in diameter, being inserted in the ground, and apparently rooting very readily. The plants grow to 15 feet in height, and when in full bloom, as they are at this season of the year, are a glorious sight. Tactic is made beautiful by this common plant, and it would seem well worth while to test it for hedges in California, where the pink form has already been introduced and is offered in the trade. The variety sent in under this number is the double white, which seems to be one of the most beautiful of all. The flowers of this form are extensively used by the Indians of Tactic for decorating the images of saints which they have in their houses and in the churches.

PRUNUS BOKHARIENSIS Royle. (Amygdalaceae.) 43988. Cuttings of *plum* from Saharanpur, India. "Alucha black." A plum from Chinese Turkestan, with medium-sized golden-yellow, cling-stone fruits of fine flavor, which ripen late in July. They are excellent for preserves and jellies.

PYRUS AMYGDALIFORMIS Villars. (Malaceae.) 44041. Cuttings of *pear* from Jamaica Plain, Mass. A small tree, native of southern Europe, occasionally 20 feet or more high, or sometimes merely a large rounded shrub. The leaves, which are very variable in shape and size, are from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in length, the white flowers, 1 inch wide, are produced in April in corymbs, and the round, yellowish-brown fruits are about an inch in diameter. The chief merit of this tree is its picturesqueness in age.

PYRUS BETULAEFOLIA Bunge. (Malaceae.) 44042. Cuttings of *pear* from Jamaica Plain, Mass. A slender, fast-growing graceful tree from northern China, attaining a height of 20 to 30 feet, with the young shoots thickly covered with a persistent gray felt. The dark green oval or roundish, dentate, long-pointed leaves are 2 to 3 inches long, the white flowers, $\frac{3}{4}$ inch wide, occur eight to ten in corymbs, and the grayish-brown roundish fruits are about the size of a pea. The Chinese use this as a stock on which to graft fruiting pears.

PYRUS CALLERYANA Decaisne. (Malaceae.) 43987. Scions of *pear* from Jamaica Plain, Mass. This wild Chinese pear is not uncommon in western Hupeh at an altitude of from 1000 to 1500 cm., and is easily recognizable by its comparatively small, crenate leaves and small flowers. This pear maintains a vigorous and healthy appearance under the most trying conditions, and might prove to be a very desirable blight-resistant stock. Also the woolly aphid, which attacks other species of pears, has not been known to touch this species.

PYRUS OBLONGIFOLIA Spach. (Malaceae.) 44050. Cuttings of *pear* from Jamaica Plain, Mass. A small tree, occasionally 20 feet or more high, common in Provence, France. The leaves are oval or oblong, and the fruits, which are yellowish, tinged with red on the sunny side, are about $1\frac{1}{2}$ inches in diameter. In Provence it is known as the *Gros Perrussier*.

PYRUS OVOIDEA Rehder. (Malaceae.) 44051. Cuttings of *pear* from Jamaica Plain, Mass. A Chinese tree of pyramidal habit, 30 to 50 feet high, with oval-oblong, sharply serrate leaves 3 to 5 inches long, white flowers in 5 to 7 flowered racemes, yellow, juicy, somewhat astringent exactly egg-shaped fruits up to $1\frac{3}{4}$ inches long. In autumn the foliage turns a bright scarlet, and the flowers appear a week ahead of other species of pears.

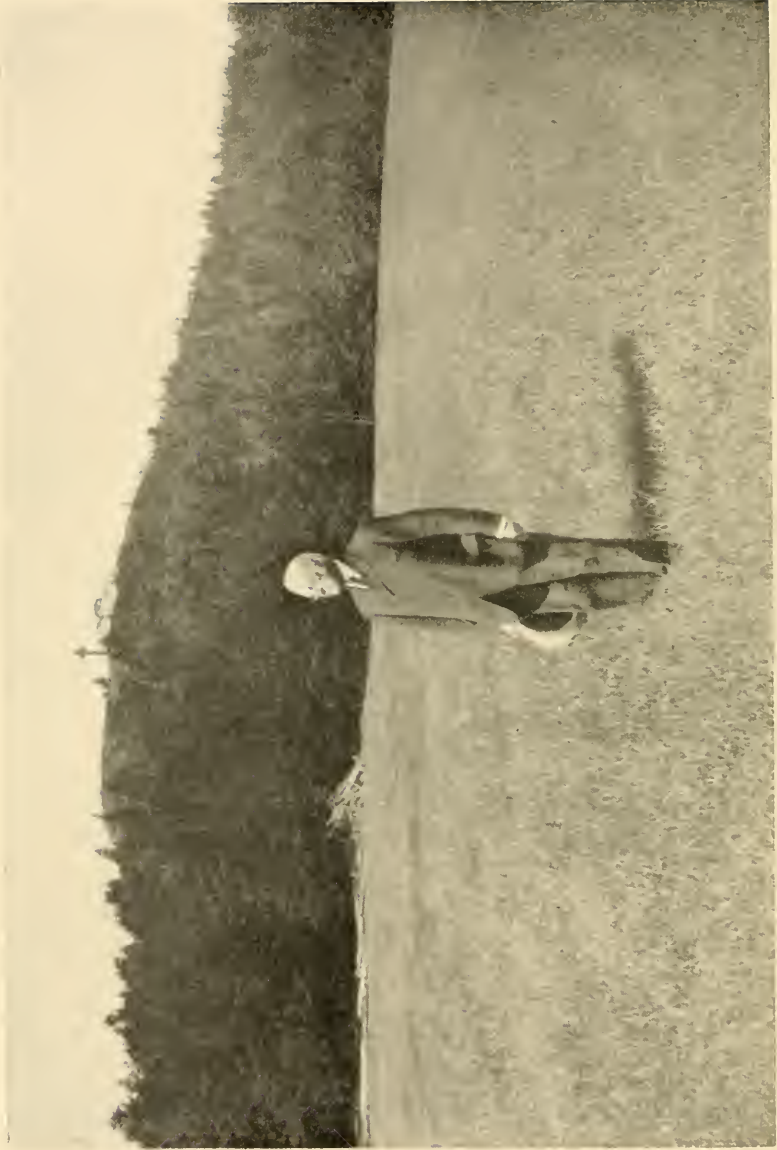
PYRUS SALICIFOLIA Pallas. (Malaceae.) 44053. Cuttings of *pear* from Jamaica Plain, Mass. Var. *pendula* Hort. A

very elegant tree, native of southeastern Europe and Asia Minor, from 15 to 25 feet high, with pendulous branches, narrow lance-shaped, finally shiny green leaves $1\frac{1}{2}$ to $3\frac{1}{2}$ inches long, pure white flowers, $\frac{3}{4}$ inch wide in dense small corymbs, and pear-shaped fruits 1 to $1\frac{1}{4}$ inches long. The leaves and flowers of this very ornamental pear often open simultaneously, producing a charming effect.

PYRUS USSURIENSIS Maximowicz. (Malaceae.) 44056. Cuttings of *pear* from Jamaica Plain, Mass. A tree, native of Amur and Ussuri, Siberia, from 20 to 30 feet high, with broadly oval, sharply serrate, acuminate leaves, many-flowered racemes of white flowers, and roundish-oval, umbilicate, mild-flavored fruits over an inch in diameter, crowned by the persistent calyx. In autumn the foliage turns a shining brownish-red, making the tree very ornamental.

SORBUS POHUASHANENSIS (Hance) Hedlund. (Malaceae.) 43996. Seeds from Jamaica Plain, Mass. An evergreen shrub from northern China, with reddish-brown twigs, leaves composed of 6 to 7 pairs of elliptic or lance-elliptic leaflets from $\frac{3}{5}$ inches long, and red fruits about $\frac{1}{3}$ inch in diameter. This shrub is in cultivation at the Arnold Arboretum.

Do not fail to mention the number assigned by the Office and printed above, in all correspondence about these plants.



PRESIDENT-EMERITUS ELIOT,
PRESIDENT OF THE WILD GARDENS OF ACADIA
ON THE SITE OF THE FRENCH MISSIONARY COLONY

The Sieur de Monts National Monument and the Wild Gardens of Acadia

By George B. Dorr



THE Sieur de Monts National Monument is the first National Park, other than military, to be established in the East. In its historic associations it is the oldest in the country, antedating by some years the landing of the Pilgrim Fathers on the Plymouth Shore. It is

also the only National Park bordering upon the sea and exhibiting the beauty and the grandeur of the ocean. To all of us who come from eastern stock, that frontage on the sea, that broad outlook on the North Atlantic, has peculiar interest. That sea it was which brought its founders to America, through danger and hardship, and gave their race the spirit of independence and adventure from which our Nation sprang. This Park, also, rising from the ocean front, links itself as none other can, not placed as it upon a harbored coast, with the Nation's greatest possession, the navigable waters that border on its coast within the three mile limit and which in Maine, whose coast line is formed by the flooding of an old land surface worn by streams, are fronted by twenty-five hundred miles of picturesque and broken shore from Portland to St. Croix. These National waters of the ocean border, commercial use apart, constitute the greatest public recreative area on the continent in the summer season, and the most democratic, for on them a man, if he so choose, can, single handed, sail his own boat from port to port along a many-harbored shore, anchoring where no private rights exist and drawing from the sea such food as money cannot buy except along the coast. Between this recreative area with its



CADILLAC'S AND BERNARD'S HARBOR
AND THE ENTRANCE TO SOMES SOUND
SEEN FROM ACADIA MOUNTAIN

boundless freedom and the National park system stands, sole link as yet, the *Sieur de Monts National Monument*, accessible by sea from every eastern port and fronting on it with a boldness and a beauty unapproached on our Atlantic Coast and rarely equalled in the world.

De Monts was the founder of Acadia, one of the three great provinces into which France divided its possessions in America, the others being the River of Canada—the lands bordering on the St. Lawrence—and, of later foundation, Louisiana, the whole great territory lying to the westward of the Mississippi and draining into it.

Acadia, like Canada, was a word of Indian origin apparently, used by the early fishermen and traders, which appears for the first time in the Commissions issued to De Monts by Henry of Navarre and his Lord High Admiral, Charles de Montmorenci, in December, 1603. Acadia then included, by the Commissions' terms, the whole vast territory lying between the latitudes of Philadelphia and Montreal to-day, and stretching indefinitely westward. Later it became restricted, by English and Dutch occupations westward, to the country draining to the ocean between the Kennebec and the St. Lawrence—Eastern Maine and Nova Scotia, New Brunswick and Cape Breton. These bounds it held, through constant border warfare, for a century and over, and it is this long possession of its coast by a great friendly nation without whose aid our independence never would have been achieved that the *Sieur de Monts National Monument* commemorates in its historic aspect.

In this aspect three figures stand out beyond others: De Monts, the soldier of ancient noble family, the follower of King Henry in the Huguenot Wars and governor of Pons, a city of refuge for Huguenots in southwestern France Champlain, the gallant sailor and discoverer, to whom Mount Desert Island owes its first description and its name; and—two generations later—the *Sieur de la Mothe Cadillac*, the founder of Detroit and first owner of Mount Desert Island, by a royal grant from Louis XIV still on record at Quebec. On it—upon its eastern side—he lived, he and his wife, sole occupants worthy at that time of

mention, according to a census of the people dwelling on the Acadian Coast which Sir Edmund Andros, governor of New England, had prepared in 1688, with intent of conquest. For a like purpose, a hostile expedition against Boston and New York, Cadillac himself four years later drew up a "Memoire" for the French Court describing the coast between the St. Croix and the Hudson, and in it thus describes the harbor at the entrance to Somes Sound.

The harbor of Monts Deserts or Monts Coupés is very good and very beautiful. There is no sea inside, and vessels lie, as it were, in a box. There are four entrances. The northeast one is the best; it has nine fathoms of water. In the eastern one, there are fourteen or fifteen; in the southeast one, there are three and a half, but in the channel there is a rock which is sometimes covered by the tide. In the western entrance there are three fathoms and a half, but to enter safely you must steer west or southwest. Good masts may be got here, and the English formerly used to come here for them.

Years afterward, when engaged in the founding of Detroit, Cadillac still signed himself in his deeds, the Lord of Mount Desert, seigneur de Monts Deserts, but presently both it and all of eastern Maine were lost to France on the battlefields of Europe and the next owner of Mount Desert Island was an Englishman, Francis Bernard, governor of the province of Massachusetts, to whom it was given by the province in reward for "extraordinary services," of a legal nature.

Governor Bernard made a voyage, in stately fashion with a considerable suite, down the coast from Boston in October, 1762, to view his new possession, and kept a journal, still extant, which brings the Island and whole coast before us very vividly. He entered the harbor described by Cadillac and explored the Southwest Harbor shore, finding a path already trodden to the Bass Harbor Marshes and many haycocks stacked there. Four families were then already settled on one of the Cranberry Islands, and two at the head of Somes Sound, a true glacial fiord which he calls a river:

October 7. Went up the river, a fine channel having several openings and bays of different breadths from a mile to a quarter of a mile. In some places the rocks were almost perpendicular to a great height. The general course of this river is north, 5 degrees east, and it is not less than eight miles long in a straight line. At the end of it we turned into a bay, and there saw a settlement in a lesser bay. We went on shore and into Abraham Somes' log house, found it neat and convenient, though not quite furnished, and in it a notable woman with four pretty girls, clean and orderly. Near it were many fish drying. From there we went to a beaver pond where we had an opportunity to observe the artificialness of their dams and their manner of cutting down trees to make them. We returned to our sloop about four o'clock. The gunners brought in plenty of ducks and partridges.

October 8. We observed sunrising but could not take its amplitude by reason of clouds near the horizon. I went through the woods to the creek of Bass Bay. We went about a mile on the salt meadows, found it fine, the hay remaining there good, and the creek a pretty rivulet capable of receiving considerable vessels. In the evening I received several persons on board proposing to be settlers, and it was resolved to sail the next morning if the wind would permit.

Governor Bernard's possession of the Island was but temporary, for he was a zealous champion of the Crown in the struggle between it and the American colonies and when the break came his American possessions, his mansion house beside Jamaica Pond—where he had received, coming out from Boston in a procession of eleven chaises, a "rebellious" committee that included John Hancock, Joseph Warren, James Otis, Samuel Adams and Josiah Quincy—and his wild island on the coast of Maine, were confiscated by the State of Massachusetts. Later, however, when the war was over, the State gave back to his son, John Bernard, an undivided half-interest in the Island, granting shortly afterward, in a generous impulse, the remaining half-interest to the grand-daughter of Cadillac, Madame de Gregoire, with her husband—French refugees—on receiving a petition from them supported by letters from Lafayette. Finally, in 1794, the Island was divided between them by the Massachusetts Court, the western portion, including the Southwest and Bass Harbors region and all else to the westward of Somes Sound, being assigned to John Bernard and those holding

under him; the eastern portion, which includes Bar Harbor, Seal and Northeast Harbors and the greater portion of the Park, to the de Gregoires, who made their home on it at Hulls Cove, and died there. Thus not only does the Park commemorate the founding of Acadia and early occupation of its region by the French but the titles by which its lands are held tell their own story, too, of Colonial governors and of the new-born State of Massachusetts' gratitude to France, expressed in the de Gregoire gift, for aid rendered in a time of greatest need, an aid that the United States are now returning in a need yet greater.

The Park's historic aspect is but one, however; another to which special importance was given in the Park's foundation, is that of the value it may be made to have in wild life conservation. In this, the opportunity it offers is extraordinary. The Island's situation midway between sea and land, sharing in both climates; the boldness and variety of its mountain landscape, broken by intervening lakes and meadows and deep wooded valleys; and its position on a great coastal bird-migration route, with a widening continent beyond it to the north, combine to make it a wonderful place for sheltering, preserving, and exhibiting the native life—plant, bird and animal—of the Acadian region, rich in species and representing the whole great eastern section of the continent to the north of Portland.

To coöperate with the Government in this, a corporation has been formed entitled The Wild Gardens of Acadia, to be governed when its organization shall have been completed by a small body of trustees appointed triennially by a few of the leading Universities of the country, by a few Natural History Museums and Biological Associations, by the American Institute of Architects and certain others interested in landscape architectural and gardening education, and by the Secretary of the Interior, head of the National Park System.

The purpose of the Wild Gardens corporation is to provide sanctuaries for the plant and animal life—the flora and fauna—of the Acadian region, places of special fitness where



SIEUR DE MONTS SPRING ENTRANCE
TO THE NATIONAL MONUMENT AND
WILD GARDENS OF ACADIA

that life in every valuable or interesting form may dwell securely and perpetuate itself in its natural environment; and to make those sanctuaries useful not only in conservation but as an opportunity for study, a source of pleasure and a means of information.

The *Sieur de Monts* National Monument is to be looked upon in this respect as its accomplishment, and nowhere in the world perhaps is there an area of like extent better fitted for such purpose. It is the summer heat and winter cold in their extremes that limit, northward and southward, the distribution of plant and animal species, and both are profoundly influenced in the Park by the surrounding ocean with its great sweeping tides. In it, accordingly, plants of the sub-arctic zone grow along with others living in the mountainous portions of Virginia and the Carolinas; and coastal species with those of the interior.

The Park itself is a remarkable piece of topography. A once solid granite mass some fifteen miles in length, facing the sea, has been carved by the greatest of all terrestrial erosive forces, ice and ocean—attacking it from opposite sides—into a dozen mountain groups, separated by deep lakes and valleys and an ocean fiord.

Firm in its resistance as no sea-laid rock—limestone, slate or sandstone—can be, splitting into giant fragments piled like masonry and making wonderful foregrounds to the blue ocean plain beyond, it is an Alpine chain in small, while every frost-rent crack and crevice on it, bottomed with sand and humus from the slow weathering of the surface and the dropping leaves, becomes a miniature rock garden filled with northern plants—blueberries and mountain cranberries, the trailing arbutus, mountain holly, and a host besides, while the bearberry with its shining foliage and brilliant, deep-red berries spreads out great carpets over the rock itself.

At the mountains' northern foot, where the ice-sheet's way was checked, and occupying the dividing valleys, through which it ground its way with concentrated force, there are deep basins, excavated glacial-fashion from the rock. These are partly filled with water, making a series of lakes and mountain tarns;



JESUP PATH, A MEMORIAL PATH WHICH
LINKS BAR HARBOR VILLAGE AND THE
NATIONAL MONUMENT

partly with peat and washed-in glacial sands and clays, the fertile detritus from a sea-laid rock more ancient than the granite which is the bed-rock of the country. In them deep-seated springs well up, unfailing, clear and cold, keeping the basins full through summer droughts and creating ideal heaths and meadows for the growth of bog and meadow plants—the rhodora, the northern kalmias, Labrador tea, the native lilies in their different species, the native iris, meadow sweet and meadow rue, the brilliant cardinal flower, wild roses, and a number of wild orchids.

The woods in the Monument are exceedingly interesting, including as they do what are now perhaps the only fragments of primeval forest—untouched but for the early loss of their great pines—along the eastern coast, plundered elsewhere for its ease of transport. There is no forest in the world that has a more delightful floor, rich in the underplants whose home is in its shade and whose soil is the leaf-mould—the accumulation of centuries perhaps in the slow-wasting north—which carpets it. Here a different group of plants displays its beauty: the *Clin-tonia*, making great beds beneath the oaks and other hardwood trees, with splendid leaves and the most beautiful blue berries in the world; the Twin Flower, beloved of Linnaeus; the Dwarf Cornel, covering sun-penetrated spaces with its white flowers and red, clustered berries; the Rattlesnake Plantain, quaintest of northern orchids, which forms delightful clumps of mottled foliage spread flat upon the ground; the Fringed Orchid and the Lady's Slippers; the Painted Trillium or Wake Robin, one of the most beautiful of woodland flowers; the Twisted Stalk with its drooping, brick-red berries; the Winter-Green and Partridge Berry; the Ground Yew that haunts the forest depths; the Ferns, the Mosses and the brilliant Fungi.

In shrubs, too, Acadia and the Park are rich. The Blueberry grows so abundantly and fruits so freely on the mountains in the Park that the Government has taken it for its emblem. The Wild Roses form great clumps along the roadsides and the banks of streams, flowering with a grace and beauty scarce any cultivated plant can equal. The Blackberry throws out long,



VIEW WEST FROM SARGENT MOUNTAIN
SHOWING UPPER SOMES SOUND
MOUNT DESERT ISLAND



A TYPICAL ACADIAN SCENE
MOUNT DESERT ISLAND

graceful stems of bloom. The Sumach takes on a habit of singular luxuriance in this northern land and is an object of delight from its first leafing in the spring until it drops its flaming, red and yellow foliage with the late autumn frosts. It is a home of the Viburnums, and the most beautiful species in the world—and the most difficult to cultivate—*V. lantanoides*, grows in it in wild profusion, lighting in June the shade of woodland valleys with its pure white bloom. At no time, from the blossoming of the *Amelanchier* or Wild Pear in spring, along with that of the first Wild Strawberries and Violets, to the strange October flowering of the Witch Hazel and the clustered fruiting of the native Rowan Tree or Mountain Ash, is there a period when flowers or brilliant fruits are lacking to make the wayside beautiful. Each period has its own beauty, too: the awakening of spring with its swift northern progress and rapidly succeeding blossoms; the midsummer period of the Wild Roses' bloom; the autumn beauty of the Goldenrods and Asters, of fruiting Thorns and brilliant *Ilex* berries and the Wild Rose hips. Nor is there any place upon the Continent where the autumnal change of leaf is of richer color or more strikingly set off. The red clumps of Blueberry are glorious then upon the granite ledges, contrasted by the grey rocks and mosses and the dark rich green of the Pitch Pine. The Oaks upon the rocky slopes below, turned to glowing crimson, are splendid against White Pines and Spruces. The Beech leaves' golden brown, the golden yellow of the Birch and Poplar, the warm-toned red of the Swamp Maple and nameless wealth of color in the heaths it borders make wonderful, illuminated foregrounds to the blue sea, the lakes or the enclosing bays as one looks down on them from the mountain paths.

Viewed in this aspect, the Park is like a great Rock Garden set by nature on the ocean verge and needing only to be made accessible by entrance roads and paths; to have its woodlands cared for and protected against disease or fire; to have such injury as men have done repaired, rank growths give place to finer ones, and every spot within its bounds of special interest or beauty given its full value. And to be made, besides, as

nature has singularly fitted it to be, a safe refuge for the region's native life—plant or animal—as the human tide sweepsover, preserving it in every finer form and handing it down—self-perpetuated in its natural environment—to future generations for their delight and profit.

The needs are clear, but the adaptation of a great coastal landscape to the annual refreshment of a multitude of men and women seeking happiness and health and energy—physical and mental uplift—after the confinements and fatigues of city life is a matter calling for the best intelligence and skill that can be given it. Rightly done, the benefit—not only to those who come but to the work they do elsewhere and the communities they serve—multiplied by the years, will be immeasurable; wrongly done, a great opportunity will have been lost, perhaps forever.

The area is unique; there is no other like it. The problem is to preserve in the midst of a great annual flood of summer visitors the wild, primeval beauty and untamed, elemental character which make it so and combine with the cool summer climate and the presence of the sea to draw men to it.

[It is a pleasure to reprint an old description of the island and Mount Desert Rock, which Mr. Dorr has supplied. At the end of that will be found a list of the *Sieur de Monts* Publications copies of which may be had by writing to The Custodian, *Sieur de Monts* National Monument, Bar Harbor, Me. To that series of pamphlets some of the leading artists, landscape architects, botanists and ornithologists have contributed, resulting in the most effectual plea for the preservation of this tract that could have been prepared. To all who love out doors, wild gardening, and everything that the *Sieur de Monts* foundation implies, it must be a source of gratification that such a unique opportunity has been so wisely fostered.—Ed.]

Description of Mount Desert Island and Mount Desert Rock, written by "An officer of the *Cygnets*" and contained among the *Bernard* papers in the Harvard College Library. The original is in Latin; the translation doubtless is as old as it.

Mount Desert is a large mountainous island lying 10 leagues west from the Island of Grand Mannan in the mouth of the Bay of Fundy; it is in the Latitude 44, 35 North, and Longitude 67, 20 West. It appears as the continent from the Sea, but is divided from it by an arm running between

it and the Main, but at low water may be crossed by a narrow neck near the West end as the Inhabitants report. Its natural Productions are Oak, Beech, Maple, and all sorts of Spruce and Pines to a large Dimention, viz: 34 inches diameter. Ash, Poplar, birch of all sorts, white Cedar of a large size, Sasafrass, and many other sorts of wood; we know no name for a very great variety of Shrubbs, among which is the Filbert. Fruits, such as Raspberrys, Strawberrys, Cranberrys of two sots, Gooseberrys and Currents. It has all sots of soil, such as dry, wet, rich, poor and barren; with great Quantities of Marsh, a number of Ponds, with runs fit for mills. Quantities of Marble, and its generally thought from the appearance of many Parts of the Land there are Iron and Copper Ore. Its Inhabitants of the Brute Creation are Moose, Deer, fox, Wolf, Otter, Beaver, martin, Wild Cat, and many other Animals of the fur kind, all kinds of wild fowl, Hares, Partridges brown and black. But the most valuable part of this Island is the extraordinary fine Harbour in it, which is formed by the Islands as described on the annex Sketch of it. Codfish is ever taken in any Quantities with very convenient Beaches for drying and curing them. Shellfish of all sorts except the oyster, none of which we saw, fine Prawns and Shrimps.

There lies from it a rock above Water, about 8 Leagues from the foot of the great Islands, and 5 leagues from the Duck Islands, which is the nearest Land to it; this rock is dangerous from its being deep Water both within and without it, so that sounding is no warning; you will have 40, 45, and 50 fathom within half a mile of it; it is steep to all sides except to the East Point of it, where it runs off foul about Pistol Shot, but dries at low water, the Tide near this rock setts strong in and out the Bay of Funday; its to be seen about 3 Leagues, and appears white from being covered with gannetts which breed and roost there. Its length is 500 fathoms from the N. E. Point to the S. W. Point, and by an observation we took on it is in the Latitude 44, 08N. I shall say no more of it, than that a good look out is necessary, and without you strike itself, there is little or no danger of being very near it; and the night is the most dangerous time to see it. A Beacon built of Stone of which the rock itself will furnish, about 50 or 60 feet high, would render it of little danger.

The Harbour (of Mount Desert) is very convenient for naval Equipments from the Number of fine anchoring places and Islands, a very fine rendezvous for fleets and Transports in case of an expedition to the West Indies, as each division of men of war and Transports may have different places to wood and water in, and Islands enough for encampment and Refreshments of men, without any danger of desertion or Irregularity. The King's Dock yards might be supplied for many years with Sparrs from 27

inches and downwards to about hook span, Docks may be easily made for Ships of the greatest Draught of Water. The above Island is about 30 miles coastways, and 90 miles Circumference, not including all its lesser Islands within a League of its Shores, which are supposed to be included in the grant of it to Governor Bernard of Massachusetts Bay by that Colony.

N. B. There are great Quantities of Pease sufficient to feed innumerable Number of Herds and Cattle, a great Quantity of Cherries, both which are natural to the Islands.

It ebbs and flows in these Harbours 21 feet at Spring Tides, and about 15 to 16 feet at common tides, which never runs so strong but a boat may be sculled against it. Water is ever to be had in the dryest Seasons conveniently; the best anchoring ground in the world.

Sieur de Monts Publications

- I. Announcement by the Government of the creation of the Sieur de Monts National Monument by Presidential Proclamation on July 8, 1916.
- II. Addresses at Meeting held at Bar Harbor on August 22, 1916, to Commemorate the Establishment of the Sieur de Monts National Monument.
- III. The Sieur de Monts National Monument as a Bird Sanctuary.
- IV. The Coastal Setting, Rocks and Woods of the Sieur de Monts National Monument.
- V. An Acadian Plant Sanctuary.
- VI. Wild Life and Nature Conservation in the Eastern States.
- VII. Man and Nature. Our Duty to the Future.
- VIII. The Acadian Forest.
- IX. The Sieur de Monts National Monument as Commemorating Acadia and Early French Influences of Race and Settlement in the United States.
- X. Acadia: the Closing Scene.
- XI. Purchas translation of de Monts' Commission. De Monts: an Appreciation.
- XII. The de Monts Ancestry in France.

- XIII. The District of Maine and the Character of the People of Boston at End of the 18th Century.
- XIV. Two National Monuments: the Desert and the Ocean Front.
- XV. Natural Bird Gardens on Mount Desert Island.
- XVI. The Blueberry and Other Characteristic Plants of the Acadian Region.
- XVII. The Sieur de Monts National Monument and its Historical Associations. Garden Approaches to the National Monument.
The White Mountain National Forest.
Crawford Notch in 1797.
- XVIII. An Old Account of Mt. Washington. A Word upon its Insect Life.
A Word on Mt. Katahdin.
- XIX. National Parks and Monuments.
- XX. Early Cod and Haddock Fishery in Acadian Waters.
- XXI. The Birds of Oldfarm: an intimate study of an Acadian Bird Sanctuary.

These publications may be obtained by writing to The Custodian, Sieur de Monts National Monument, Bar Harbor, Maine.



A CHINESE PRIMULA
WITH YELLOW AND ROSE FLOWERS
P. BEESIANA

*Plants from China**



THE third expedition into China to discover new plants suitable for introduction into the United States has been completed by F. N. Meyer, plant explorer of the United States Department of Agriculture, who has just returned to Washington after a three-year trip in the Far East. As a result of this expedition through the center of China, and two previous explorations of similar duration covering extremely cold Manchurian regions and the arid regions of Chinese Turkestan, there have been sent to America for planting and testing for commercial adaptability, seeds, roots, or cuttings of some 3,000 food and forage plants, flowers, ornamental shrubs and vines, shade and timber trees. The previous expeditions brought to America specimens of many cold-resistant and dry-land grains, sorghums, soy beans, alfalfas, and forage plants, and also certain semitropical plants, such as the bamboo, which are now under experimentation to determine their usefulness for the extreme South.

Of the many specimens forwarded to this country during the last expedition, the specialists regard as most significant the jujube, a fruit new to this country, which may be suitable for use in the Southwest; a wild peach resistant to alkali, cold, and drought, the root system of which offers great possibilities as a grafting host; certain Chinese persimmons larger than any hitherto known in this country; a number of aquatic food roots and vegetables which offer promising possibilities for the utilization of swamp land; some thirty varieties of vegetable and

* Next to E. H. Wilson it is probable that Mr. Frank N. Meyer of the U. S. Department of Agriculture has brought from Eastern Asia more important plants than any other explorer. The statement of the government after his return from his third Chinese exploration will interest all who have kept in touch with the work of these two men in Eastern Asia.—Ed.

timber bamboos; and a number of Chinese vegetables, bush and climber roses, shrubs and trees.

Of scientific rather than commercial interest is the discovery on this expedition, near Hangchau, of a hickory tree, the first found in China. The existence of this tree, together with the facts that the sassafras and tulip trees are common in both countries and the Chinese tea box tree is closely related to the sweet gum of the South, confirms the fact that the flora of the southeastern United States and that of sections of China are closely related. Another discovery of botanical interest was the finding in a remote and hitherto unvisited valley in Tibet of a hazel tree 100 feet high—a surprising departure from the hazel bush. Elsewhere English walnuts were discovered in a wild state; and the discovery of the wild peach is regarded as significant because it seems to establish that the peach may have been a native of China rather than of Persia, to which its origin has been ascribed. The discoveries of native and hardy oranges and other citrus fruits, a number of which have been brought to this country for breeding work, give added evidence that China was the home of the orange, which was introduced into other countries probably by early Portuguese travelers. Similarly many plants commonly ascribed to other countries, such as the wistaria, chrysanthemum, lilac, azalea, and certain peonies and rambler roses, have been developed by the Chinese, although, because they reach Caucasian use through other nearby nations, their Chinese origin often has been overlooked.

The first or experimental exploration for new plants in China in 1905 was undertaken by the Department because the wide range of climate, rainfall, elevation, and soil conditions in that immense country gave promise that the Chinese, who had been farming successfully in some sections for about 4,000 years, might have found solutions for special difficulties which confronted American farmers in regions of excessive cold, or drought, or alkaline or swampy soils.

The investigators quickly found that China also offered a particularly fertile field for plant introduction work because for many centuries the Chinese farmers, in a crude way, had been



DAPHNE GENKWA
THIS FORM FROM WESTERN CHINA IS
HARDIER THAN JAPANESE PLANTS
ARNOLD ARBORETUM



CHINESE PRIMULA WITH
VIOLET FLOWERS
P. MEMBRANIFOLIA

selecting seeds and developing improved varieties now ready for commercial use in the United States. In many cases all that is needed is to bring the seed or plant to this country and use it, although in other cases, inasmuch as Chinese methods rarely produce pure strains, some further seed or plant selection is necessary to obtain constant varieties.

To locate these special varieties, however, it is necessary for the explorers to visit not merely individual villages but even to study single farms. There are no seed stores in China and no mechanism for extending the use of improved varieties. Superior varieties grown on one farm often are not used on adjoining farms, and are unheard of ten miles away. The farmer who develops an improved variety guards it jealously and gives seeds or cuttings or scions only to his immediate relatives. In the case of fruits, the Chinese farmer is averse to spraying or other treatment for diseases, largely because his ancestors have never done this, and the adoption of modern methods would be considered irreverent. As a result, excellent varieties which are traditional or mentioned in Chinese literature have either disappeared completely, or are to be found only on isolated farms. A striking example of this is the fact that the section around Shanghai even forty years ago was famous for a special kind of peach, although today this variety has completely disappeared.

In the last trip the explorer penetrated through the center of China 1,500 miles on foot to the borders of Tibet and returned to the coast by a different route. On this expedition he covered territory the agricultural conditions of which are very similar to those of the southern Rocky Mountain regions and portions of the Great Plains.

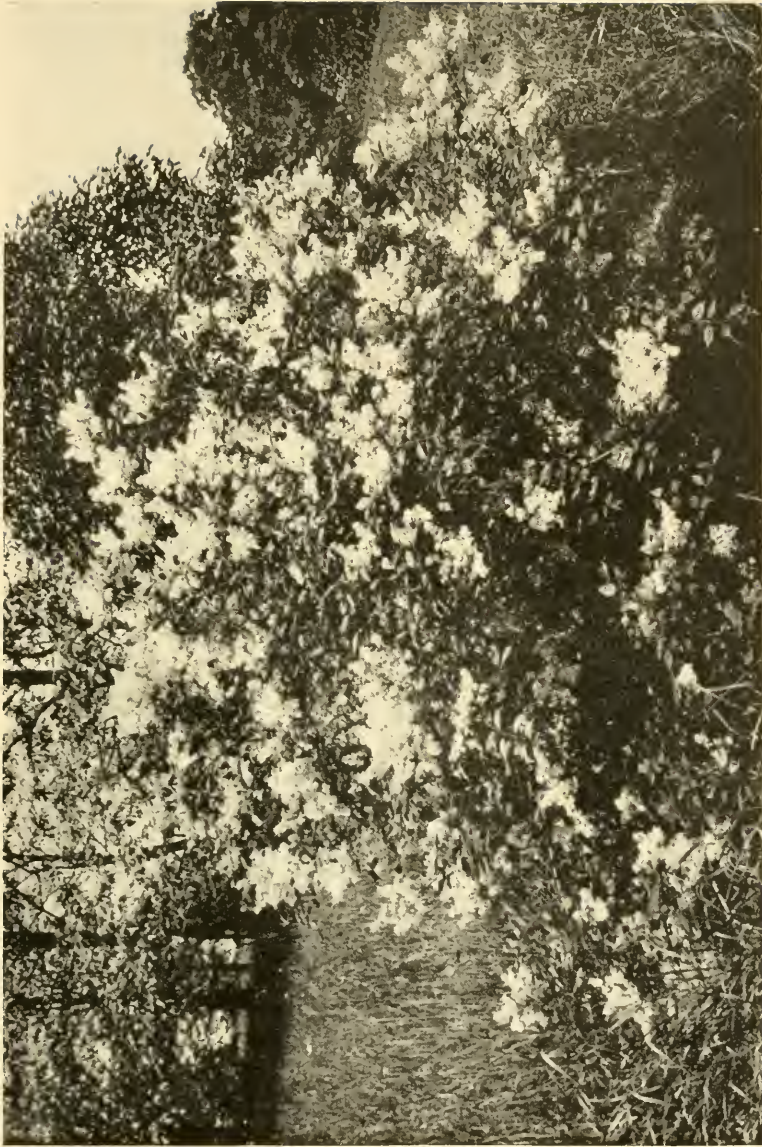
In this territory, the most important discovery probably was the jujube tree, which bears a heavy crop of a brownish fruit, which is delicious when fresh and when dried offers a confection very similar in taste to the Persian date. This tree is of particular interest to the Department because it can withstand cold and drought and neglect. The section in which it is productive in China is a semiarid belt where winter tempera-

tures do not go much below zero Fahrenheit. This indicates that it would be of particular value to Texas, California, New Mexico, Arizona, southern Utah, and perhaps even farther north. Already, several thousand seedlings have been grown at the Plant Introduction Garden at Chico, California, from the specimens sent to this country, and some of these have borne desirable fruit, which confirms the experimenters in their belief that this tree may contribute a new fruit industry to the sections indicated.

The wild peach discovered in China, and now brought to this country for the first time, is considered of great interest although its fruit is not desirable. Investigation in its native habitat showed that the roots of this plant are not as susceptible as our native peach to alkali in the soil, while it will withstand cold and does not require much moisture. Experiments are under way, therefore, to determine the usefulness of the root-stock of this peach for grafting with different hardy American varieties. If success is achieved, the specialists believe that they can develop peach trees which will make possible the raising of peaches in the Southwestern or alkaline sections, and at the same time offer possibilities of peach cultivation in many droughty and cold regions, and possibly even into portions of Iowa beyond the northern edge of our present peach region.

Of special interest also are the collections of aquatic food plants secured in the recent expeditions. These include water chestnuts, water nuts, and a number of aquatic bulbs, as well as the water bamboo. The Chinese, the explorer found, have mastered through centuries of experiments the process of using swamp lands for the raising of food crops, and their success is believed to point to commercial possibilities for some of our swamp regions where reclamation by drainage is not practicable. Whether the American farmer would ever be willing, however, as a commercial enterprise, to grow crops which call for cultivation in water waist-deep is, the specialists admit, open to question.

The kauba, sometimes called wild rice or water bamboo, now to be made the subject of experiment, is a vegetable in taste



NEW CHINESE SPECIES OF LILAC
SYRINGA JULIANAE
ARNOLD ARBORETUM

somewhat between grass and asparagus. The swollen stalks of the plant are eaten much like our asparagus. The ordinary bamboo, contrary to the prevailing opinion, is not an aquatic plant, and for successful cultivation calls for fertile and well-drained soil.

In selecting Chinese vegetables for introduction the explorer was greatly limited by the fact that many articles favored by Mongolian palates would be unpleasant to Caucasians. He has sent over, therefore, only those things which promise to add valuable vegetables or fruits to the American table, and also which fit in with a general plan for the introduction of certain food crops which will find a ready market among our Chinese populations. The Chinese, in many cases, are importing large quantities of favorite native foods in canned or dried form from China because they find difficulty in getting them in a fresh state in our larger cities. Some of the vegetables brought over which promise to find a dual market are a number of varieties of vegetable bamboo and improved varieties of pe tsai, the odorless Chinese cabbage, some kinds of which already are on sale as "celery cabbage" in American markets. This cabbage is suitable for cooking or for cold slaw and can be grown wherever ordinary cabbage is raised. A vegetable novelty now under experiment is a Chinese radish with a root as large as a child's head. This is somewhat coarser and inferior in flavor to the small radish, though the Chinese cook it much like turnips, and also pickle it in strips in brine for use as a relish.

This and other explorations have given to this country a Chinese cherry, very successful in California because of its early maturity; and a number of varieties of wild pears and apples, wild almonds, and hardy citrus fruits which offer possibilities for hybridization with American varieties.

The explorer also brought over specimens of the Chinese pistache tree, which it is hoped will give the United States a new and valuable tree for the adornment of city avenues in Georgia, Alabama, the Carolinas, Florida, Texas, California, Arizona, and Oregon. Plantings were also secured on this trip of a Chinese white pine tree remarkable for its white bark.



PRIMULA LICHIANGENSIS

One of these specimens which Mr. Meyer brought has been planted on the grave of the late Minister to China, W. W. Rockhill, who once expressed in the explorer's hearing a wish that this be done. Because of its drought-resisting qualities, this strikingly ornamental tree offers possibilities for the beautification of parks and grounds in Arizona, Texas, New Mexico and California.

Especial attention was given on this trip to investigations of chestnut blight, which was found by the explorer first in China and later on in Japan. In the eastern United States this blight appears in virulent form and is exterminating our beloved chestnut. The explorer, however, found Chinese chestnut trees which were to some degree blight resistant. Many of these trees had suffered from the disease but had apparently recovered from severe attacks and succeeded in covering the old scars with new wood.

To lovers of flowers the new Chinese rose known as the *Rosa xanthina* should be of special interest, particularly in view of the fact that there is at present a great demand for yellow roses. This bush has small, light yellow flowers, but its great quality is its hardiness which will enable it to flourish in the North even as far as Canada. The chief promise of this rose, however, lies in the fact that it will in all probability lead to the production of new hardy types of yellow roses adapted to cultivation in America. It may produce varieties which will not drop their leaves like our Persian yellow roses do and yield varieties with larger and more showy flowers. In addition, the explorer found a number of new rambler roses, particularly certain yellow ramblers which, if locally successful, will meet a demand for a climbing rose with a flower differing in shade from the crimson and pink flowers of the well-known rambler varieties.

Report of the Tuxedo Horticultural Society Show



THE Tuxedo Horticultural Society held their annual Flower Show in the ball room, Tuxedo Club House, on October 26 and 27, all the proceeds of which were given to the Red Cross. The keen competition and the quality of the flowers were all that could be desired. Exhibits were staged from all the principal private estates in Tuxedo Park and the honors were well divided after the judges had finished their work. All the plants and flowers and fruit were sold for the benefit of the Red Cross. The judges were J. Everitt and J. F. Johnston, Glen Cove, L. I.; Wm. Scott, Elmsford, N. Y.; H. Allen, Hyde Park, N. Y.; W. Marshall, Staatsburgh, N. Y.; R. Scott, Pittsfield, Mass., whose decisions were well received by all the exhibitors. The show was held under the patronage of the following ladies; Mrs. C. B. Alexander, Mrs. H. C. Loomis, Mrs. H. W. Munroe, Mrs. W. M. V. Hoffman, Mrs. E. H. Harriman, Mrs. R. Mortimer, Mrs. H. Van Sinderen, Mrs. Paul Tuckerman, Mrs. H. M. Tilford, Mrs. J. Murray Mitchell, Mrs. G. G. Mason, Mrs. R. Delafield, Mrs. A. Seton, Mrs. A. Monell, Mrs. Geo. W. Douglas and Mrs. Theo. Frelinghuysen. There were more than 125 classes in the show and in each class there was keen competition. The following are a list of the principal prize winners:

Two Specimen Ferns, first, Mr. H. M. Tilford; second, Mrs. D. Wagstaff.

Six Foliage Plants, first, Mr. G. F. Baker; second, Mr. H. M. Tilford.

Three Begonias, first, Mrs. J. Murray Mitchell; second, Mr. H. H. Roger.

Table of Plants, first, Mr. H. M. Tilford; second, Mr. C. B. Alexander.

Table of Orchids, first, Mr. H. H. Roger; second, Mr. Geo. F. Baker.

Collection of Hardy Flowers, first, Mrs. L. Chanler; second, Mrs. S. Spencer.

Bush Chrysanthemum, first, Mrs. Wagstaff; second, Mrs. S. Mortimer. Flowering Plant, first, Mrs. Morell; second, Mr. Keech.

Six Chrysanthemum Plants, first, Mrs. H. M. Tilford, second, Mr. J. I. Blair.

Fifteen Chrysanthemum Blooms, first, Mr. J. I. Blair; second, Mr. H. M. Tilford.

Collection of Pompom Chrysanthemums, first, Mrs. J. Murray Mitchell; second, Mrs. Morell.

Vase of Chrysanthemums, first, Mr. C. B. Alexander; second, Mr. H. M. Tilford.

Collection of Single Chrysanthemums, first, Mr. H. M. Tilford; second, Mrs. J. M. Mitchell.

Three Vases of Single Chrysanthemums, first, Mrs. J. Murray Mitchell; second, Mr. H. M. Tilford.

Vase of Anemone Chrysanthemums, first Mr. G. G. Mason; second, Mr. J. I. Blair.

The principal prize winners in the Rose classes were Mr. G. G. Mason, Mr. H. M. Tilford, Mrs. J. Murray Mitchell, Mrs. Morell, Mr. C. B. Alexander and Mr. J. I. Blair.

THOMAS WILSON,
Secretary.

International Flower Show at the Grand Central Palace, New York, in the Spring of 1917



THE Spring Flower Show at Grand Central Palace in 1917 surpassed in wealth and merit of exhibits any that have gone before. That the public was appreciative of the tremendous efforts of the professional and amateur growers is attested by the fact that about one hundred thousand people visited the show.

In the nature of things, and considering architectural difficulties, one show looks in its *tout ensemble* much like previous ones and it may well be that the general arrangement of the show in Grand Central Palace has reached its ultimate development. The huge pillars through the center of the floor offer an almost insurmountable difficulty in any attempt to inject new ideas as to the "landscaping" of the show. But to all, except those who feel sure that this defect cannot be overcome, Grand Central Palace was transformed into a veritable fairyland of flowers.

The prize offered by the International Garden Club for the best exhibit of the show went to Mr. Adolph Lewisohn. A picture of this, with its thousands of beautiful flowers arranged with a taste that has won similar prizes in the past, is reproduced herewith. The Park Department of Manhattan, with a beautiful exhibit of foliage and flowering plants, and Brooklyn with an interesting cactus exhibit, were the City's contribution to the success of the Show.

The Dutch Garden of John Scheepers and Co. with thousands of bulbous plants in flower was one of the best in the commer-



PRIZE EXHIBIT, INTERNATIONAL FLOWER
SHOW, 1917. PRIZE OFFERED BY INTERNATIONAL
GARDEN CLUB, WON BY ADOLPH LEWISOHN, ESQ.

cial classes. Our picture of this on another page gives a good idea of the general effect of this exhibit. No words, or a mere black and white illustration, can convey the gorgeous coloring of these bulbous plants to one who had not the good fortune to see it. Three firms entered rock-gardens, and they proved among the most popular of all the exhibits. These were constructed and stocked by A. N. Pierson and Co., Julius Roehrs Co. and by Bobbink and Atkins, to all of whom should be extended the thanks of the management and the public for adding so much to the attractiveness of the show.

Pages could be filled with descriptions of individual plants of merit shown by scores of professional and amateur exhibitors, some of the roses especially warranting more space than our brief review will allow. More and more of the private growers participate in these spring flower shows and much of their success must ultimately depend on this support.

Two very fine rose gardens were shown by A. N. Pierson Inc. and F. R. Pierson, and both proved very attractive to the public. As in the past the show was under the auspices of the Horticultural Society of New York.

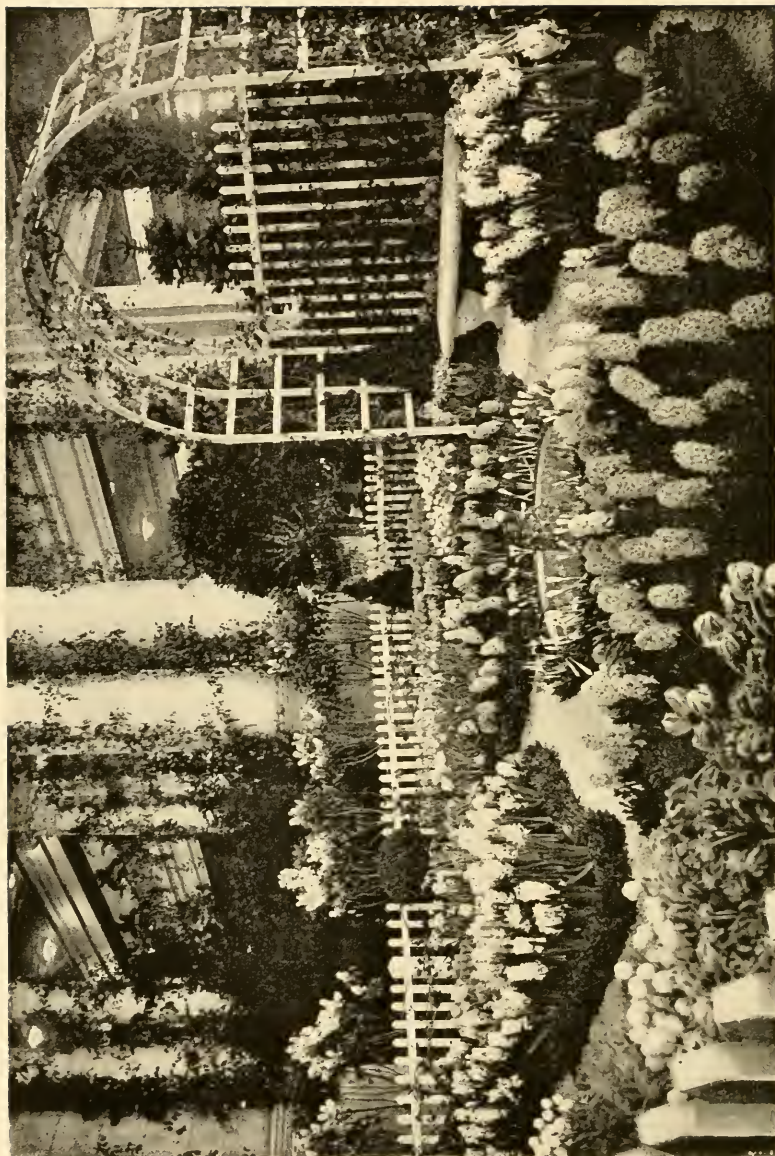
A partial list of the most prominent prize-winners includes the following:

Plants in Flower. P. W. Popp, gardener to Mrs. H. S. Darlington, who won first honors for a group of flowering plants and bulbs covering three hundred square feet, with J. W. Smith, gardener to F. V. Lewis, second honors; James Stuart, gardener to Mrs. F. A. Constable; William W. Vert, gardener to Howard Gould; R. M. Johnson, gardener to W. B. Thompson; John Canning, gardener to Adolph Lewisohn; A. M. Golding, gardener to D. G. Reid; Robert Tyson, gardener to Mrs. H. McK. Twombly; Robert Jones, gardener to Percy Chubb; Charles Ruthbun, gardener to Mrs. E. G. Meyers, Jr.

Roses in Pots and Tubs. R. M. Johnson, J. W. Smith, Robert Jones.

Bulbous Plants. George Ferguson, gardener to Mrs. Payne Whitney; James A. MacDonald, Joseph Tansey, Thomas Wilson, gardener to Mrs. J. Murray Mitchell; E. Fardel, gardener to Mrs. A. M. Booth; P. W. Popp.

Orchids. E. Edwards, gardener to Arthur N. Cooley; J. P. Moseman, gardener to Clement Moore; P. E. Venzie, gardener to Col. H. H. Rogers;



DUTCH BULB GARDEN, FIRST PRIZE
JOHN SCHIEPERS AND CO.
INTERNATIONAL FLOWER SHOW, 1917

R. M. Johnson, James Stuart, A. M. Golding, Thomas Page, gardener to William H. Walker.

Palms and Foliage Plants . James Stuart, A. M. Golding, William Whitton, gardener to Mrs. J. H. Flagler; R. M. Johnson, R. Heidkamp, gardener to Mrs. H. W. Boettger; J. W. Smith.

Cut Roses. A. A. Macdonald, Duke's Farm; George Ferguson, R. M. Johnson, William Whitton, A. J. Loveless, gardener to William E. S. Griswold; James Stuart and John Canning.

Carnations. A. M. Golding, D. F. Roy, gardener to H. E. Converse; William Reid, gardener to S. and A. Colgate; Robert Jones and William Vert.

Sweet Peas. William Whitton, David Francis, gardener to Mrs. Charles Bradley; William W. Vert, J. W. Smith, Robert Grunnert, gardener to W. W. Reiss.

Book Reviews

The Book of the Peony. By MRS. EDWARD HARDING. (217 pp. J. B. Lippincott Co., Price \$6.00.)

This book comes to us as a very welcome addition to the literature of the garden and is unique in the sense that it is the only work yet published devoted exclusively to the peony, dealing with the plant not only as to its cultivation alone, but also its history and aesthetic value.

In the preface the author calls attention to the fact that "the knowledge of a finer cultivation of the peony has remained the property of the comparatively small number who have made its growing either a hobby or a business." With this in mind the book should be judged, for as the author says it is "With the hope of bringing the modern peony before those who do not know it, this book has been planned." If the author has not succeeded in doing this, it is not because she has failed to place before the lovers of good gardening a very readable and instructive book.

Chapter one deals with the glories of the peony and the author has sung its praises so well that those who read the book, not already enthusiastic, will be sorely tempted to make an immediate move toward the cultivation of a plant which is capable of bringing forth so forceful a presentation of its charms, and will be most sure to find themselves coming under the spell of the peony.

In the second chapter the mythology and history of the peony is very entertainingly set forth and from it one may learn many things about the flower which serve to make its cultivation the more interesting.

The third chapter takes up the question of best varieties of herbaceous peonies and their characteristics, describing and illustrating the eight different types of blooms recognized by the American Peony Society, and gives five short lists of choice varieties in separate colors and a tabulated descriptive list of one hundred and twenty-five varieties selected on their merits, including desirable peonies of all prices. Also a short list of new and rare high priced varieties.

Beside the lists of varieties given the subjects of color, size, season of blooming and fragrance are discussed.

While this chapter will be found very useful to the uninitiated there are several things in it that the professional grower may criticize. The small

cuts illustrating the different types are not altogether satisfactory in as much as they give a very poor idea of the real forms of the flowers. Small photogravures of typical blooms would have served the purpose much better.

In the main list of peonies we note several statements which do not agree with the generally accepted descriptions. Under the caption of "Extending the period of bloom" chapter four discusses the principal species cultivated in gardens in the order of blooming and also a list of early mid-season and late varieties of *Paeonia albiflora*. Many useful and entertaining facts are brought out, but as to extending the period of bloom the author would accomplish this by a judicious selection of species and varieties and not by any method of cultivation. These are all classed under six divisions and a fair idea of each is given, but under the sixth division, *albiflora* and its varieties, statements are made which would be of more value if capable of verification.

Chapter five will be a very useful one to the novice in peony growing as judicious purchasing is an important factor of success. The pitfalls are many and the unaided beginner is sure to fall into some of them. There is much good advice given which, though intended for the purchaser should, by reflex action, be of great value to those who sell.

The next chapter "Where to plant and how to prepare the soil" will be found equally useful with the preceding, and in fact one of the best features of the book. It is equally valuable to the amateur, landscape planter, and professional grower.

The following chapter is scarcely less practical in its suggestions on planting and cultivation, but exceptions might be taken in regard to the statement which calls for the instant plunging of the stems of freshly cut peonies in a pail of cool water. This practice while good in itself is not always practical and the large grower of peonies soon learns that blooms which have become badly wilted, recover freshness if placed in water in a cool cellar. However, much of the pleasure derived from the growing of peonies depends upon the observance of many of the suggestions made in this chapter. In the next two chapters the tree peony is dealt with, the author considering it so distinct in its habits that a special feature should be made of it. One can not read its history as portrayed by her without feeling that its more general cultivation is most desirable but it should be entered into with great caution for so far, much disappointment has been experienced by those who have indulged in it, either from lack of knowledge of the proper handling of the plant or from some peculiarity which nearly defies the most lavish care that can be given it.

The chapter on its history makes very entertaining reading, and the

careful instructions given for its cultivation should encourage growers in a wider cultivation of this supremely beautiful flower.

The last chapter is devoted to the different species of the Genus *Paeonia*, a list of which is given with various notes and observations. While not necessary to the enjoyment of a peony garden, a knowledge of these species is well worth attaining.

Professor Whetzel's lecture on the diseases of the peony is added as an appendix and a careful reading of this should result in great benefit to all who cultivate the plant. It is a summing up of such investigations as have been made along this line, which up to the present time have not been as thorough as the importance of the subject demands.

This review would not be complete without a few words about the illustrations. The photogravures are worthy of much praise for they are fine examples of this method of illustration and show very clearly the individuality of form in the particular flower represented.

As much can hardly be said of the color prints which are not of an even quality. A few are superb specimens of the art of color printing, while others are of doubtful value and add little to the appearance of the book.

Taken as a whole it is a sumptuous volume and much praise is due the author for placing before the gardening public a book containing so much valuable information and one calculated to inspire a wider appreciation and a more extended cultivation of this fascinating flower.—A. H. FEWKES

Plant Materials of Decorative Gardening: Woody Plants. By PROF. WILLIAM TRELEASE. (204 pp. published by the author, Urbana, Ill.)

A handy, limp leather volume designed to aid in the identification of the woody plants used in the Garden. There are keys and descriptions of all the plants one is likely to see in even the best stocked garden or estate, outside of botanical gardens. Over eleven hundred different shrubs and trees are dealt with, always with the point of view of identifying them. To all this is a prime necessity for further familiarity, and one can scarcely decide what to plant without knowing at least the name of the shrub or tree having the desired character. Professor Trelease, now the professor of botany at the University of Illinois and for many years director of the Missouri Botanical Garden, has made the keys as simple as possible, and used them on students, so that the little book before us has had the advantage of extended use before it was finally published. It is small enough to slip in the pocket and should prove an indispensable little volume to the intelligent gardener and even for professional men. Those desiring the book should write to Prof. William Trelease, University of Illinois, Urbana, Ill.—N. T.

Outdoor Theatres. By FRANK A. WAUGH. (Richard G. Badger, Boston, 1917. Price \$2.50.)

This is a useful and timely sketch of the subject of outdoor theatres, containing plans of twenty-seven of them and pictures of many others with descriptions and discussions of their uses and of the problems of design. It is useful and timely because, while even in war time we must have amusement, the outdoor theatre has the advantage of being not only one of the most harmless and elevating of recreations but does so much for the spirit of community, of teamwork, of learning to amuse ourselves instead of paying others to amuse us, in which, as a nation we are so lacking.

As one looks through the book nothing is so striking as the difference in design of the various examples. It would seem as though there were more room for variety in outdoor theatres than in any other kind of structure. Not only are no two alike, but it is somewhat difficult to find what they have in common. In fact, all that they have in common is an enclosed stage and an auditorium and the openness of both to the sky. If you have an enclosed space for a stage and a place for the audience to sit, you have an outdoor theatre. This really means that anyone who has a piece of ground as big as half a tennis court can have a practical and beautiful outdoor theatre by a proper arrangement of the trees, bushes, hedges or fences with which he may elect to enclose his stage. You could make a very pretty stage by planting a dozen bushes in a half square or semicircle, and with a contiguous piece of grass, with or without camp chairs for the audience, the outdoor theatre is complete. Dressing rooms may be part of the scheme, or may be in any convenient building or behind any convenient screen of foliage or anything else. Of course this is not suited for ambitious performances, but for small and private ones, children's plays, recitations, concerts and so forth, such a thing could be arranged on almost any place that is larger than a 'lot.' It may often be made to be part of the general planting scheme so as not to be noticeable as a feature apart, except when in use. The real defect in so simple an affair is the lack of separation between audience and stage. The stage should be higher if possible, but should at least have a barrier of some kind which, in this case, might be a low hedge or moveable border of interlaced boughs where the footlights would be indoors.

Professor Waugh is discouraging and not altogether consistent in his views of the uses of the outdoor theatre. He would "never present on an outdoor stage any performance which can be better cared for indoors. This would practically eliminate all modern drama." Not only that, but it would eliminate most of Shakespeare (whose masterpieces Professor Waugh

considers "reasonably available for outdoor performance") Racine, Moliere, and in fact almost any drama written for indoors. For if a play is imagined and adjusted for indoor conditions, it will be only an accident if it is as well as or better suited for outdoors. This judgment seems too sweeping. Let us consider the essential differences between the outdoor and indoor theatre.

The indoor theatre has not only an enclosed stage, but an enclosed auditorium. Furthermore, the stage is illuminated and the auditorium darkened, causing the greatest possible concentration by the audience on the stage-picture and action.

On the other hand, the outdoor theatre, though enclosed at the sides, has no roof, and the auditorium is as light as the stage excepting for night performances. The result is less concentration of attention and more diffusion of thought and impression among the audience. This may be expected to call for more simple and definite dramatic design and speech and action on the stage, and in fact, these are the conditions that the outdoor theatre does call for. It makes no difference that the stage may be of grass, the wings and backdrop of trees, bushes, hedges or pergola columns, for any of these, or rather, imitations of them, might be used for similar purposes indoors. The only basic difference between the outdoor and the indoor theatre is that the latter shuts out the sky.

Again, we must not forget the radical difference between the outdoor theatre by day and night. At night, when the auditorium is dark and the stage in artificial light, the conditions do not differ greatly from those of the indoor theatre. There is almost as much concentration on the stage as indoors. There is the added mystery of the night, the sense of being in the limitless open, the pure air, all aiding to key one up to a greater sensibility, a more romantic expectation. In such conditions, the only kind of drama that cannot be appropriately presented will be that which depends on stage management or machinery or setting, or is trifling, banal, ephemeral, local, too thin in design and construction, too dependent on facial expression, byplay or stage business, lack of carrying power, or any kind of small scale, petty or ignoble quality unfitting it for the canopy of the sky. Why should not the *Servant in The House* or *Paid in Full* be given in the open air? But, on the other hand, such a piece as *The Seven Keys to Baldpate* could not but lose some of its fun, its snap and point if played out of doors, simple though its stage setting may be. Or, again why should not the *Rivals* or *She Stoops to Conquer* be played out of doors? Comedy is not inconsistent with fresh air, or we should have to exclude *As You Like It*; nor even farce, for then Aristophanes would have to seek cover,

a thing he never thought of. Neither is complexity of plot and change of scene necessary hindrances to outdoor presentation, for both these are characteristic of Shakespeare, and the changes of scene can be handled in the simple ways of his own time.

In short, it would be difficult to find any real play, that is, one depending for its interest on the interplay of human emotion that could not properly be presented out of doors. Of course, the play and the presentation must be adjusted to the theatre, the audience and the available resources in funds and actors. It would be quite out of proportion to stage a first class performance of a standard play in some little garden theatre, and no less so to invite a large audience to buy tickets to a display of juvenile theatricals—unless to raise money for a war charity, which is another matter.

All this is not saying that any good play could be produced in any outdoor theatre. Some plays would fit one theatre, some another. One could even imagine a Pinero drawing room play in some small and sophisticated outdoor theatre. What kind of plays were produced two or three centuries ago in the small Italian garden theatres? Probably what we should call light comedy or society plays as often as not. Recalling the precedents for many kinds of drama out of doors, farce comedy and deep tragedy of the ancient and modern classics, it is plainly unsafe to dogmatise on what could not be well presented out of doors, given the right conditions. In the last analysis one's own judgment should enable one to decide whether any particular play is suited to a particular theatre and audience.

As for stage effects, properties and setting, it is astonishing how few are needed to produce an illusion. The writer has seen a very enjoyable version of *Midsummer Night's Dream* played in an open grass court by schoolboys and girls with nothing but the dresses and music to aid the actors; and he recalls the deep impression made by a really excellent performance of Synge's play "*The Shadow of the Glen*" on a grass stage with sides and background of foliage and two or three pieces of furniture to represent the interior of an Irish farmer's cottage in which the action takes place. No one seemed to miss the walls and roof or to require any further aid to the imagination.

Professor Waugh evidently has no use for cement seats, and we may presume that he hates stone seats also, for cement can be made to look nearly as well as stone. His denunciation seems a little too sweeping. Where there is no architecture about the stage, cement seats would be plainly out of place; but for 2,000 years and more outdoor theatres of many kinds have been built with stone and cement seats, and the custom will no doubt per-

sist. Stone seats can be used not only in stadia and Greek theatres, but in very much smaller and simpler ones as in the very attractive little garden theatre of Mr. Charles Gould at Tarrytown, N. Y. where the stage is enclosed by cement columns. With a stage in keeping, the tiers of stone seats are very handsome. Being permanent, they are probably more economical in the long run than wood seats or chairs, and they are much less uncomfortable to sit on than they look, and where they are considered a hardship, can easily be mitigated by movable mats or strips of carpet. Like anything else, they are good in the right place, bad in the wrong one.

In conclusion, we recommend the subject of outdoor theatres to the consideration of any and everyone. We are all likely to need a good deal of amusement for the next year or two to divert our minds, if only for a while from the one absorbing subject of the war. In view of the mental training, the mutual help and community spirit that outdoor theatricals elicit and foster, their potential usefulness in raising money for the causes bearing on national defense, their small relative cost—for excepting where the performers are paid, the initial cost of the structure is the only serious expense, and this is always small relative to the community it serves, whether it is merely part of a suburban yard or a civic amphitheatre—it would be hard to find a form of recreation more pleasant and profitable than can be had in the outdoor theatre.—HAROLD A. CAPARN.

Garden Farming. By LEE CLEVELAND CORBETT. (Ginn & Co., 1913. 473 pp. illustrated. \$2.00. *Country Life Education Series.*)

In this book Professor Corbett gives the results of observations and investigations in market-gardening, truck-farming, and the forcing industry, (as applied to vegetables) under the comprehensive title *Garden Farming*. It is to be noted that the author makes a distinction between Market Gardening and Truck Farming—the former being defined as, “That branch of olericulture which has for its object the production of large quantities of a great variety of the standard vegetables and small fruits to supply the demand of the local market,” while the latter “Has for its object the production of a few crops in large quantities for more or less remote markets.”

About one-fourth of the volume deals in a general way with the soil and its preparation, the principles of planting and cultivation, forcing and forcing structures, transportation, precooling and cold storage of vegetables, the home vegetable garden, etc. The rotation of crops, plant diseases, insecticides and fungicides, the sterilization of the soil, and fertilizers receive con-

sideration in this section. The problems concerning the storage of vegetables in pits, root-cellars, or in especially built storage houses are discussed rather fully, as also are their packing and transportation.

Part two, the major part of the book, "is devoted to a discussion of the development, cultivation, and uses of the important vegetable crops grown in the United States either by market gardeners, truck-farmers, or amateur gardeners." The methods of cultivation, harvesting, and storing of the important vegetables are given in detail, and, when the crop is grown in widely separated parts of the country, the practices of growers in the different sections are described.

The treatment of the subject in this part is as full as could be desired. Taking Cabbage as an example; there are descriptions of its cultivation as a market garden crop, as a truck crop, and as a farm crop. The various types of Cabbage, the preparation of the ground, cultivation, harvesting and marketing, enemies and diseases, storing, the uses of cabbage, and even a method of making Kraut are included.

In the cases where the vegetable under consideration is also produced as a forced crop there is a discussion of the various means adopted, and of the different types of structures used. An alphabetical arrangement of the subjects is followed in this section.

There can be but little adverse criticism of the advice given and the methods of cultivation advocated. The arrangement of the book, however, leaves much to be desired, as the plan adopted involves considerable repetition. The following instances will serve to illustrate. The Cucurbitaceous crops, Cucumbers, Melons, Squashes, and Pumpkins, require more or less the same cultural conditions, are subject in a large measure to the same pests and diseases, and could, with advantage, have been treated as a group. Instead of this they are scattered throughout the second part of the book under five distinct headings resulting in a great deal of useless repetition; thus a method of making guards for the protection of these crops against the Striped Cucumber Beetle is described no less than three times.

Formulas for the treatment of seed potatoes to prevent scab are given three times, and the method of making Bordeaux mixture which requires a rather lengthy description, is described twice.

One feels that the book would be of greater value if more of the information had been presented in tabular form, and if the first part of the book dealing in general with soils, plant diseases, insecticides and fungicides, etc., had been increased at the expense of the section dealing with the various vegetables in detail.

However, the information is there, authoritative and exact, and, although it is not always presented in a manner easily accessible to the reader, forms a valuable contribution to the literature of vegetable growing.

The book is primarily interesting to commercial growers and students, but all those who are concerned with the cultivation of vegetables will find much that is helpful in its pages.—MONTAGUE FREE.

My Growing Garden.—By J. HORACE MCFARLAND. (216 pages, MacMillan Co. \$2.25.)

A very useful book on the making of a garden spot from an old and practically abandoned property has been written by Mr. McFarland, the chief horticultural printer and publisher in this country. As a record, largely, and confessedly personal, of the joys and sorrow of planting; of breathless expectation and final achievement, the book will delight those who have passed through, or are in the throes of a similar enterprise. Many practical hints and schemes for planting are outlined, but the author does not fail to enlarge on that feeling for gardeners and gardening which has filled English literature with delightful reading from James Thomson to our own time.

The book is arranged in twelve chapters, one for each month, and the author leads us from the earliest stirring of the hunt through the seedsman's catalog through the garden panorama to winter's snow. There are 36 plates, five in color, the rest in sepia, which serve as admirable illustrations of a garden book that is quite out of the ordinary.—N. T.

The Garden Beautiful in California.—By ERNEST BRAUNTON. (Cultivator Publishing Co. 1915.)

This is not, as its title might suggest a book on garden design, nor is it even a handbook of planting design. The single chapter devoted to garden planning is neither adequate or fortunate in treatment or in content. The following chapters, which deal with various available plants and their cultural requirements are of more value although one does not find sufficient emphasis put on many desirable species which are essentially Californian, and some space is given to plants adequately treated in literature from the eastern gardens. Typical are the very inadequate generalizations about the genera *Acacia*, *Eucalyptus*, *Pittosporum*. The book will do well for a beginner discovering his plant materials but will not supply all the knowledge needed for the attainment of the *Garden Beautiful*.—B. Y. MORRISON.

Flower Lore and Legend. By KATHARINE M. BEALS. (245 pages, Henry Holt & Co., \$1.25.)

This book as its title implies is a collection of stories and legends about flowers. There are many quaint legends of garden flowers and the author seems to have been very successful in bringing these to light. With many of them are associated short poems and the catholicity of taste as to the selection of these reaches from mediaeval carols through Shakespeare to Felicia Hemans and William Winter! Some of the writing is very beautiful especially the section on the Water Lily, the Orchid and the Passion Flower. From St. Catherine to the moderns, and back to the most ancient myths the author leads us through a wealth of story. If the book had been indexed it would be a mine of ready reference to those who want the contents of even such books as these at instant call. For the more leisurely it will be found delightful reading, many of the stories being fascinating pictures of a by-gone day. The book has no horticultural value, but there are interesting tid-bits of gardening history, such as the story of the rediscovery of *Cypripedium Fairieanum* near Lhassa in 1905, 29 years after its disappearance.—N. T.

Text-Book of Mycology and Plant Pathology. By JOHN W. HARSHBERGER. (779 pp. 270 illustrations, P. Blakiston's Son and Co., Philadelphia. Price \$3.00).

The author of this new book on mycology and plant pathology has endeavored to prepare a text suitable to the needs of college and university students. He has embodied in it subject matter and methods of presentation which he states have been found by him in twenty-seven years experience as a teacher of botany to be well adapted to the class room. The book would seem, however, to make a somewhat wider appeal. It contains information which will be found serviceable to the teacher, investigator, and layman

The subject matter of the book is divided sharply into four parts—I. Mycology, II. General Plant Pathology, III. Special Plant Pathology and IV. Laboratory Exercises in the Cultural Study of Fungi. The pages dealing with mycology include material on the slime moulds and bacteria as well as on the true fungi. Preliminary chapters on the phylogeny, ecology, geographical distribution, and physiology of the fungi, are followed by others dealing with the classification, general morphology, and cytology of the members of the sub-divisions of the group. The system of classification employed is somewhat unusual, as the use of such words as *Ascomycetales* and *Phallomycetes* would indicate.

The portion of the book dealing with plant pathology gives in considerable detail a discussion of the various teratological phenomena manifested in plants. The different types of diseases and their symptoms are enumerated and described. There are also chapters on pathologic plant anatomy, and a brief presentation of the methods employed in practical tree surgery.

No chapter in the book will perhaps make a stronger appeal to the layman than that in which is presented a list of the "common and important diseases of economic plants in the United States and Canada" arranged alphabetically according to host. Accompanying this list are numerous citations to American literature. A considerable number of the more common diseases are discussed and notes on the life history and methods of control are given in each case.

The book is abundantly illustrated, and the laboratory exercises as outlined embrace a large amount of valuable material. Practically every phase of laboratory technique is touched upon. The book as a whole contains much interesting information, not found in other texts, which is adapted to the needs of the beginner.—H. M. FITZPATRICK.

The Pruning Manual. By L. H. BAILEY. (407 pp. with 381 illustrations. The Macmillan Co. Price \$2.00).

This is the eighteenth edition, revised and reset, of *The Pruning Book* first published in 1898. The present volume largely follows the plan of the previous editions, being divided into two parts, the first dealing with "The Fundamentals." The rationale of pruning is discussed in this section and a description given of the various kinds of fruit buds and the manner in which they are borne on the plant, whether on spurs, young wood, or old wood. A chapter is devoted to wounds and how they heal, with a discussion of the various dressings used to prevent the entrance of organisms causing disease. The mending of trees, and methods of bracing or supporting old or weak trees is also treated. There is a section on "Tree Surgery; Pruning Street Trees," contributed by George E. Stone. This, of course, nowadays, is a very large subject on which a volume can easily be written, but it is admirably treated by this writer in a small compass. There is some overlapping, probably unavoidable, with the description of the treatment of tree wounds in the preceding chapter.

Considerable space is devoted to the *principles* underlying successful pruning. The wisdom of this is evident when it is remembered that the effects of pruning are dependent in a large measure on climatic and soil conditions and any rule of thumb method which might be successful in one locality may be entirely the opposite elsewhere.

Part two—"The Incidentals"—is concerned with advice on how to prune transplanted trees, directions with regard to the management of various fruits, root-pruning, ringing, girdling, etc. Shade and ornamental trees, roses and shrubs are also dealt with here, and there is a short discussion with a pruning list of ornamental shrubs and trees by Ralph W. Curtis which should prove of great value to all who have to deal with the management of shrubbery.

The chapter devoted to special modes of training, with particular reference to the trained fruit trees that are a feature in many European gardens, has been greatly improved by the addition of new illustrations. Some may question the advisability of devoting so much space to a form of training that, so far, has found but little favor in America. On the other hand, with the increase of interest in what may be called "fine" gardening, these elaborately trained trees, cordons, palmettes, and espalier trees generally, are quite likely to be more widely grown. The fact that they occupy but little room, and the mental and manual exercise, provided in pruning and training them, should appeal especially to owners of small places who prefer to do much of their garden work themselves.

A large part of the book is taken up with the pruning of the grape. The various systems of training are fully described and the merits or demerits of each discussed. There is a chapter on the pruning of the vinifera grape, the major part of which was written by Frederic T. Bioletti under the heading of Vine-Pruning in California.

The illustrations are decidedly better in this edition, some have been redrawn, and the half tones of *The Pruning Book* are replaced with line drawings resulting in the addition of more point and greater clearness.—MONTAGUE FREE.

School and Home Gardens. By W. H. D. MEIR, of the State Normal School, Framingham, Mass. (Ginn & Co., 307 pages, illustrated. 80c. net.)

This book, as its title suggests, deals with children's garden work from the side of both home and school. It takes up exactly the plant materials to use under different conditions and how to use them. The book is strong on the "doing side." It solves the problems of the beginner who feels at a loss on how to start worthwhile garden work for boys and girls.—E. E. SHAW.

Gardens and Their Meaning. By DORA WILLIAMS, of the Boston Normal School: (Ginn & Co., 235 pages, illustrated \$1, net).

A book well suited to the needs of Normal and Training schools for Teachers. The educational side of the book is strong and sound. It is full of suggestions and rich in helpful material for use in the elementary schools. The book makes a strong appeal to educators. At the same time it is very concrete and practical in the treatment of its subject matter.—E. E. SHAW.

The Botany of Crop Plants. By W. W. ROBBINS. (Pp. 681. Blakiston's Son and Co., Philadelphia, 1917. Price \$2.00.)

This compact volume is avowedly a textbook. As such, it contains some information of comparatively little value to the average gardener and omits much which would be consulted by persons whose interests in plants is outside the classroom. The subjects of propagation and cultivation are seldom discussed, even in the most general terms. The preparation of the products after they have left the producer is sometimes described and sometimes not. Thus, one finds several pages on the manufacture of the various cotton products and a short description of wine-making, but nothing at all on the preparation of the olive. The first 67 pages of the book is an exposition of the fundamental principles of plant morphology, with special reference to the features emphasized in the second part. The latter, comprising nine-tenths of the book, takes up the various crop plants in turn, including only the species in common cultivation within the United States. These are arranged by families, beginning with the grasses and ending with the composites. Under each family is a botanical description of its general characters and a key to the genera of economic importance. This is followed by a discussion of each species, of a length proportional to its importance and ranging from 33 pages for Indian corn down to a few lines for some species of *Allium*. This discussion includes not only the structure of the plant, but also its origin and history, its environmental relations, its present geographical distribution, and frequently valuable notes on its pollination. Each chapter closes with a short bibliography and the whole book with an excellent glossary and index. The work is illustrated throughout with numerous half-tones and line drawings which add greatly to its value.—H. A. GLEASON.



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| 50. <i>The Old Gardens of Italy</i> —Le Blond..... | Miss Bissell |
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| 52. <i>The Book of the Chrysanthemum</i> —Folwell.. | Mrs. J. N. Dickinson |
| 53. <i>My Garden in Autumn and Winter</i> —
Bowles..... | Mrs. Frank B. Porter |
| 54. <i>Garden Trees and Shrubs</i> —Wright..... | Mrs. Fred Frelinghuysen |
| 55. <i>Manual of Agriculture</i> —Emerson and
Flint | } S. D. Brewster, Esq. |
| 56. <i>Forage and Fiber Crops in America</i> —
Hunt | |
| 57. <i>Citrus Fruits</i> —Coit..... | Mrs. Charles S. Brown |
| 58. <i>Every Day in my Garden</i> —Verplank..... | Mrs. Philip J. Sands |
| 59. <i>The Garden Primer</i> —Tabor and Teall.... | Mrs. Henry W. Watrous |
| 60. <i>The Chrysanthemum</i> —Herrington | } Mrs. C. W. McAlpin |
| 61. <i>Daffodils</i> —Jacob | |
| 62. <i>Small Grain</i> —Carleton..... | Miss Margaret J. Achelis |
| 63. <i>Success in Market Gardening</i> —Rawson.... | Mrs. T. G. Condon |
| 64. <i>Irrigation Farming</i> —Wilcox..... | Walter Jennings, Esq. |
| 65. <i>A Garden of Simples</i> —Flint..... | Mrs. Robert C. Taylor |
| 66. <i>Trees, Shrubs, Vines and Herbaceous Bor-</i>
<i>ders</i> —Kirkregard..... | Mrs. Frederick Culver |
| 67. <i>Gardening for Profit</i> —Henderson..... | Mrs. Elijah P. Smith |
| 68. <i>Two Thousand a Year on Fruits and Flowers</i>
—Barnard..... | Mrs. Henry Phipps |
| 69. <i>Gardening for Beginners</i> —Cook..... | Mrs. Albert Strauss |
| 70. <i>A B C of Vegetable Gardening</i> —Rexford | } Miss Edith Van Courtland
Jay |
| 71. <i>Landscape Gardening</i> —Vaugh | |
| 72. <i>Economic Entomology</i> —Smith..... | Ira Barrows, Esq. |
| 73. <i>Yard and Garden</i> —Baker..... | Mrs. Howard Dickinson |
| 74. <i>Our Mountain Garden</i> —Thomas..... | Mrs. Wm. A. Burnham |
| 75. <i>The Garden, You and I</i> —Wright..... | Mrs. Mortimer Flag |

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| 76. <i>Farm Crops</i> —Burkett. | Miss Elizabeth Achelis |
| 77. <i>Farm Management</i> —Warren. | Mrs. Walter B. James |
| 78. <i>Manures and the Principles of Manuring</i> —
Aikman | Miss Elizabeth Kean |
| 79. <i>Book of Iris</i> —Lynch. | Miss S. Grace Fraser |
| 80. <i>Trees in Winter</i> —Blakeslee. | Mrs. James B. VanWoert |
| 81. <i>The Book of Corn</i> —Myrick. | A. C. Chapin, Esq. |
| 82. <i>The Hop</i> —Myrick. | Mrs. A. C. Chapin |
| 83. <i>Injurious and Useful Insects</i> —Miall. | Mrs. W. P. Hardenbergh, Jr. |
| 84. <i>Popular Garden Flowers</i> —Wright. | Miss J. K. Fraser |
| 85. <i>Soils, Their Properties and Management</i> —
Lyon. | Mrs. Wm. Graham Fleming |
| 86. <i>Garden Crafts in Europe</i> —Triggs. | Mrs. Frederick Allien |
| 87. <i>New Onion Culture</i> —Greiner. | Mrs. J. H. Mohlman |
| 88. <i>Wood and Garden</i> —Jekyll. | Miss Justine Erving |
| 89. <i>Propagation and Pruning</i> —Newsman | Mrs. A. F. Lauterbach |
| 90. <i>The Home Vegetable Garden</i> —Kruhm. | Mrs. H. S. Rokenbaugh |
| 91. <i>Vegetable Gardening</i> —Green. | Mrs. Wm. R. Thompson |
| 92. <i>Bulb Growing for Amateurs</i> —Thomas. | Mrs. Paul Morton |
| 93. <i>The Book of Town and Window Gardening</i> —
Bardswell. | Samuel T. Peters, Esq. |
| 94. <i>The Fern Collector's Guide</i> —W. Clute. | Mrs. James Herman Aldrich |
| 95. <i>Plant Breeding</i> —Bailey. | Mrs. Charles M. Gay |
| 96. <i>How to Know the Mosses</i> —Dunham. | Mrs. J. Howard Wainwright |
| 97. <i>Perpetual Carnations</i> —Cook. | Mrs. James Herman Aldrich |
| 98. <i>Little Gardens and How to Make the Most</i>
<i>of Them</i> —Thomas. | Colonel C. S. Wadsworth |
| 99. <i>Garden Planning and Planting</i> —Thomas | |
| 100. <i>How to Know the Wild Flowers</i> —Dana. | Mrs. George L. Bailey |
| 101. <i>Commercial Carnation Guide</i> | Mrs. John I. Waterbury |
| 102. <i>Productive Farming</i> —Davis. | John I. Waterbury, Esq. |
| 103. <i>The Soil</i> —King. | Mrs. Ed. Dean Adams |
| 104. <i>Weeds of the Farm and Garden</i> —Pammel. | Mrs. Dwight Collier |
| 105. <i>Commercial Gardening</i> , 4 vols.—Weathers. | Mrs. Clarence Cary |
| 106. <i>Wall and Water Gardens</i> —Jekyll. | H. F. Dupont, Esq. |
| 107. <i>Insects Injurious to Fruits</i> —Saunders. | Mrs. Charles D. Dickey |
| 108. <i>Italian Gardens</i> —Elgood. | Mrs. Cass Gilbert |
| 109. <i>The Book of Hardy Flowers</i> —Thomas. | Mrs. B. Aymar Sands |
| 110. <i>A Plea for Hardy Plants</i> —Elliott. | Mrs. Harry Pelham Robbins |
| 111. <i>The American Flower Garden</i> —Blansham. | Mrs. Georgine Iselin |
| 112. <i>Soils and Crops</i> —Hunt. | Mrs. J. S. Auerbach |
| 113. <i>Chemistry of the Farm</i> —Warrington. | Mrs. Edwin C. Jameson |
| 114. <i>Field Management and Crops</i> —Parker. | Mrs. F. A. Constable |
| 115. <i>Plant Culture</i> —Oliver. | Miss E. Chamberlain |
| 116. <i>English Vegetable Gardening</i> —Ealand. | Miss Florilla Niles |
| 117. <i>Soil Fertility and Permanent Agriculture</i> —
Hopkins. | Mrs. J. Berry Harpending, Jr. |
| 118. <i>Scientific Examination of Soils</i> —Wahn-
schaffe. | Mrs. J. D. Adams |
| 119. <i>Making Horticulture Pay</i> —Kains. | Mrs. Charles B. Alexander |

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| 120. <i>Elements of Agriculture</i> —Warren..... | Mrs. Grosvenor |
| 121. <i>Productive Farm Crops</i> —Montgomery..... | Miss Caroline White |
| 122. <i>The Herb Garden</i> —Bardswell..... | Mrs. C. C. Peters |
| 123. <i>The Potato</i> —Fraser..... | Edward W. Sheldon, Esq. |
| 124. <i>Gardening in Town and Suburb</i> —Thomas | Mrs. Fordyce Barker |
| 125. <i>The Hardy Flower Book</i> —Jenkins..... | Mrs. Charles B. Alexander |
| 126. <i>Practical Floriculture</i> —Henderson..... | Mrs. G. L. McAlpine |
| 127. <i>Insecticides, Fungicides and Weed-killers</i> —
Bourcart..... | Mrs. Herbert Satterlee |
| 128. <i>My Summer in a Garden</i> —Warren..... | Mrs. George F. Chamberlain |
| 129. <i>A Book of Gardens</i> —Waterfield..... | Mrs. George Fraser |
| 130. <i>How to Know the Ferns</i> —Parsons..... | Mrs. V. S. Mulford |
| 131. <i>Landscape Gardening</i> —Maynard..... | Mrs. George Legg |
| 132. <i>The Book of Pansy Viola and Violet</i> —Crane | Mr. and Mrs. Edwin B. Sheldon |
| 133. <i>Ferns</i> —Woolson..... | Mrs. A. B. Jennings |
| 134. <i>Lawns</i> —Barrow..... | Mrs. J. C. Moore |
| 135. <i>Indian Corn Culture</i> —Plumb..... | Mrs. Elihu Chauncey |
| 136. <i>Peach Culture</i> —Fulton..... | Miss Lucy W. Talmadge |
| 137. <i>The Book of the Rose</i> —Melliar..... | Miss Mary dePeyster Carey |
| 138. <i>Bush Fruits</i> —Card..... | Mrs. E. H. Weatherbee |
| 139. <i>Diseases of Cultivated Plants and Trees</i> —
Massee..... | Mrs. F. H. Eaton |
| 140. <i>Rock Gardens</i> —Meredith..... | Mrs. J. W. Harriman |
| 141. <i>Small Fruit Culturist</i> —Fuller..... | Mrs. Henry Peal Talmadge |
| 142. <i>The Art of Landscape Gardening</i> —Repton.. | Mrs. E. H. Harriman |
| 143. <i>Aristocrats of the Garden</i> —Wilson..... | Mrs. Edwin Gould |
| 144. <i>How to Make a Fruit Garden</i> —Fletcher... | Mrs. Graham Ryle |
| 145. <i>Roses</i> —Darlington..... | C. F. Quincy, Esq. |
| 146. <i>Cyclopedia of Horticulture</i> (6 vols)—Bailey | Miss Elizabeth Cockcroft Shettler |
| 147. <i>The Landscape Beautiful</i> —Waugh..... | F. C. Littleton, Esq. |
| 148. <i>Hardy Plants for Cottage Gardens</i> —Albee.. | Mrs. H. J. Park |
| 149. <i>Practical Landscape Gardening</i> —Credland. | Mrs. J. A. Trowbridge |
| 150. <i>Tree Wounds and Diseases</i> —Webster.... | Mrs. Edward S. Harkness |
| 151. <i>The Spraying of Plants</i> —Lodeman..... | Mrs. Henry Rogers Mallory |
| 152. <i>Quince Culture</i> —Meech..... | Mrs. W. T. Carrington |
| 153. <i>Landscape Gardening</i> —Parsons..... | Mrs. H. DeB. Parsons |
| 154. <i>Modern Strawberry Growing</i> —Wilkinson... | Mrs. J. Ogden Armour |
| 155. <i>Asparagus</i> —Hexamer..... | A. N. Huntington |
| 156. <i>The Garden and Its Accessories</i> —Under-
wood..... | Mrs. Herbert L. Pratt |
| 157. <i>The Ideal Garden</i> —Thomas..... | Mrs. John L. Terry |
| 158. <i>Parsons on the Rose</i> —Parsons..... | Henry C. Wells, Esq. |
| 159. <i>The Book of Daffodils</i> —Bowne..... | Thomas Crimmins, Esq. |
| 160. <i>The Flower Garden</i> —Bennett..... | Miss Anita Bliss |
| 161. <i>Flower Gardening</i> —Bridgeman..... | S. D. Leonard, Esq. |
| 162. <i>Landscape Gardening Book</i> —Tabor..... | Mrs. H. L. Thomas |
| 163. <i>The Book of Asparagus</i> —Illot..... | Mrs. George B. Sanford |
| 164. <i>Corn Crops</i> —Montgomery..... | Mrs. H. W. Chappell |
| 165. <i>Home Vegetable Gardening</i> —F. F. Rockwell | Mrs. Jefferson Coddington |

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| 166. <i>American Grape Growing and Wine Making</i> —Husmann. | Mrs. John T. Atterbury |
| 167. <i>Spraying Crops</i> —Weed. | Mrs. Robert Endicott |
| 168. <i>Bean Culture</i> —Sevey. | Mrs. McC. Butt |
| 169. <i>Gardens in the Making</i> —Godfrey. | Mrs. Frederic E. Church |
| 170. <i>Manual of Manures</i> —Vendelmans. | Mrs. John H. Burton |
| 171. <i>Annuals and Biennials</i> —Gertrude Jekyll. | Mrs. Hamilton Fish Kean |
| 172. <i>Book of Winter Gardening</i> —Bissett. | Mrs. George Bliss Agnew |
| 173. <i>Garden Design in Theory and Practice</i> —Apgar. | Mrs. W. H. Crocker |
| 174. <i>Book of Garden Plants</i> —Hamblin. | Mrs. Archer Huntington |
| 175. <i>Making the Grounds Attractive with Shrubbery</i> —Grace Tabor. | |
| 177. <i>Soils and Manures</i> —Russell. | Mrs. L. Stuart Wing |
| 178. <i>Dahlias</i> —Gordon. | Mrs. John Murray Mitchell |
| 179. <i>Farm Friends and Farm Foes</i> —Weed. | Mrs. George C. Fraser |
| 180. <i>Intensive Culture of Vegetables</i> —Aquatias. | Mrs. Schuyler Schiefflin |
| 181. <i>Window Gardening</i> —Williams. | |
| 182. <i>Garden Ornaments</i> —Mary H. Northend. | Mrs. William Steele Gray |
| 183. <i>American Carnation</i> —Ward. | Mrs. Van Rensselaer |
| 184. <i>Fertilizers and Manures</i> —Hall. | Mrs. Robert DeW. Sampson |

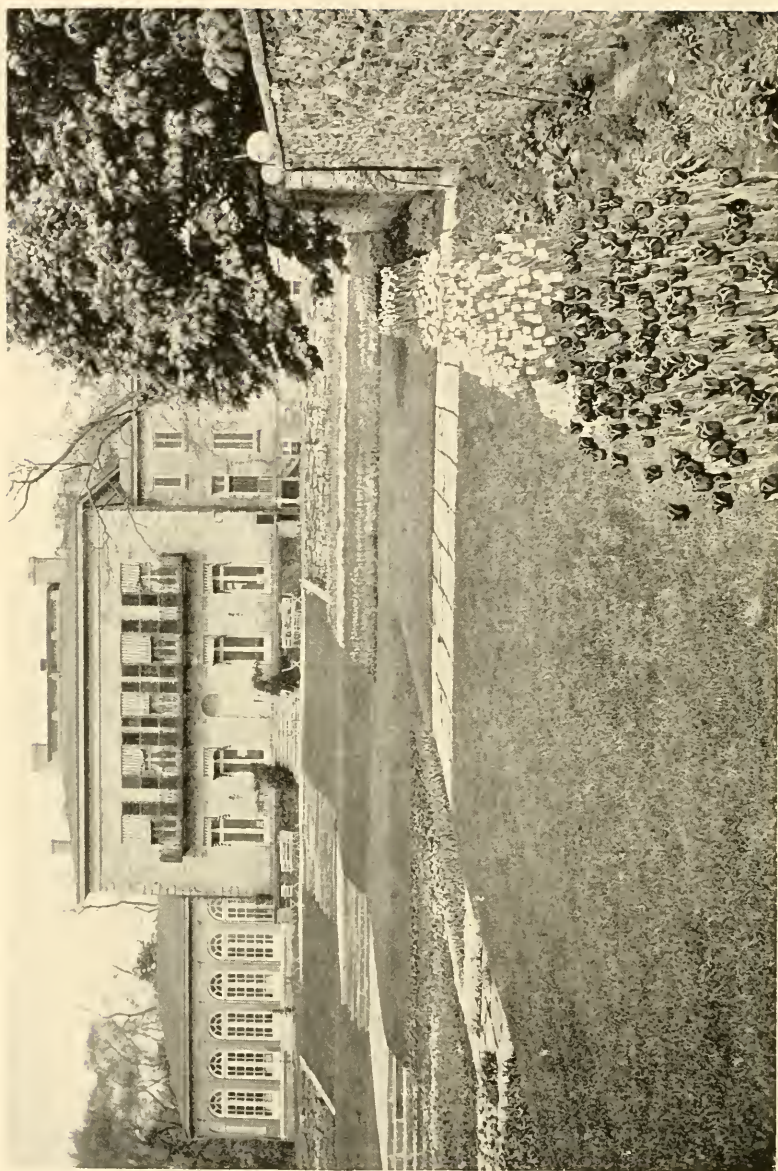
The Chairman of the committee, Mrs. Clarence Cary, announces that owing to illness and to the war, and the consequent difficulty of getting books from abroad, some subscriptions to the Library Fund remain unexpended and some books already purchased are not recorded here. A later report will be published. It is hoped to fill in gaps in the book collection as rapidly as possible.

The following periodicals are now received at the Library those marked with an asterisk coming to us as an exchange for our own JOURNAL.

Florists Exchange
Country Gentleman
 **Garden Magazine*
House and Garden
Country Life in America
The Countryside
 **Soil Science*
 **Gardening*
 **American Forestry*

**Landscape Architecture*
 **Horticulture*
 **Missouri Botanical Garden Bulletin*
 **Brooklyn Botanic Garden Record*
 **New York Botanical Garden Journal*
 **Leaflets from Arnold Arboretum*
 **Journal Royal Horticultural Society*
 **The Gardeners Chronicle* (England)

MRS. CLARENCE CARY,
Chairman Library Committee.



LA TULIPE NOIRE, FOLLOWED IN THE ORDER
NAMED, BY LOVELINESS, MAY QUEEN, CLARA BUTT
INTERNATIONAL GARDEN CLUB, BARTOW

Report of the Gardens Committee, International Garden Club, Bartow Mansion, New York City



THE following report of gardening work is mostly made up from notes taken by Mr. James McGregor, Head Gardener.

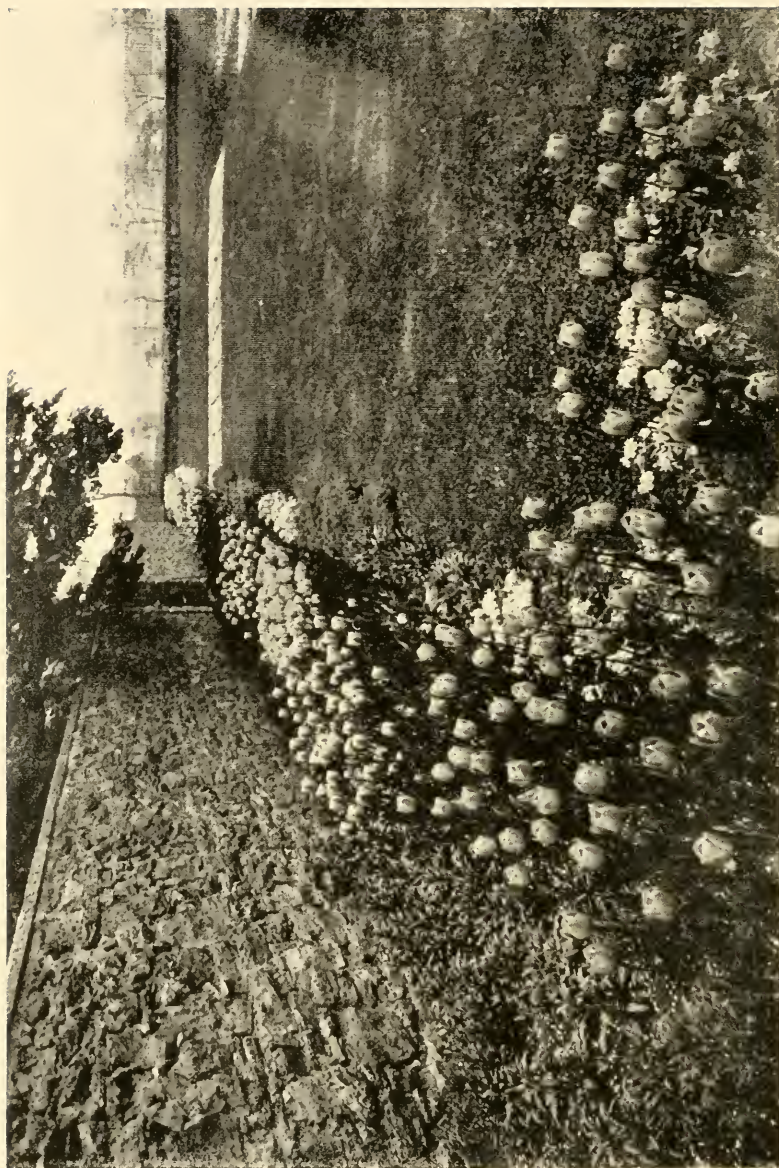
1916

Mr. Charles H. Totty donated the following chrysanthemums for outdoor culture in lots of 10, 25 and 30, over 1000 in all.

- 1 Petite Jean, pure white
- 2 Cranfordia, deep bronzy yellow
- 3 Debutante, white
- 4 A. Basham, orange bronze
- 5 Crimson Pride, crimson
- 6 Evelyn, crimson bronze
- 7 Etel. d'Or., yellow
- 8 Firelight, brilliant carmine
- 9 Francis, bronzy red
- 10 Harvest Home, deep yellow
- 11 La Rehin, reddish terra cotta
- 12 L'Aisne, violet purple

These have all proven good, early, hardy, standard varieties, suitable for bedding or cutting.

Bought of Isaac Hicks and Son of Westbury, Long Island, the following evergreens, donated by Mrs. James Sullivan Smith, in memory of her brother, former Governor of New York.



DARWIN TULIP BARONNE DE LA TONNAYE AND
CLARA BUTT AT
BARTOW

- 20 White Pines, 9 feet high
- 20 White Pines, 10 feet high
- 10 Oriental Spruce from 6 to 12 feet high
- 10 *Pinus cembra*, 5 feet high
- 5 *Abies concolor*, 5 feet high
- 10 White Pine, mixed sizes

Donated by Isaac Hicks and Son

- 1 Alcock Spruce, $1\frac{1}{2}$ feet high
- 1 Balsam Fir, 2 feet high
- 1 Austrian Pine, $1\frac{1}{2}$ feet high
- 1 Red Pine, $1\frac{1}{2}$ feet high

All these pines and spruces have proved very hardy. After coming through a very severe winter, they have made a fairly good start, except *Abies concolor* which seems to be unsuited to this district. During the winter and spring 3 have died, and the two surviving have made very little growth.

Bought of The Cottage Gardens Company, Queens, N. Y., May, 1916. The following:

Donated by Mrs. James Sullivan Smith.

- 50 Rhododendron, Album Elegans, $4\frac{1}{2}$ feet
- 50 Rhododendron, Album Elegans, $3\frac{1}{2}$ feet
- 100 Rhododendron, Parsons Grand, 3 and 4 feet
- 100 *Pinus mughus*, 3 and 4 feet
- 20 *Juniperus Pfitzeriana*, 4 feet
- 12 *Retinospora pisifera*, 5 feet
- 6 *Retinospora obtusa*, 7 feet

All these varieties have proved very hardy, came through a very severe winter and have made a new growth of from 1 to 2 feet on an average.

From John Scheepers and Company, New York, November, 1916:

Donated to the Club:

- 1000 Tulips in two varieties
- 500 Rev. H. Ewbank, lilac
- 500 Ellen Willmott, yellow

Very good varieties for bedding out.

There were planted out in beds on the terrace garden, in the fall of 1916 to flower in the spring of 1917.

The following Darwin tulips in groups of from 75 to 150.

Clara Butt, salmon pink
Wm. Copeland, lavender
Barrone de la Tonnaye, rose color
La Noir, black
Painted Lady, white
Rev. Ewbank, violet color
Margaret, pale rose
Prof. Rauwenhof, cherry red
Few Brilliant, scarlet
La Candeur, white
Euterpe, lilac
Mrs. Moon, yellow

All these tulips proved very satisfactory. Some of them especially so, such as Prof. Rowenhof, and Few Brilliant which sent up 2 or 3 flowers from one bulb. The flowers when cut lasted from 5 to 8 days in water.

1917

January 22, 23, and 24, there were planted out on the trial grounds 3000 Darwin Tulips, donated by John Scheepers and Company, New York. We could not distinguish any difference between these tulips and those that were planted out on the terrace garden, November 1916—except in the stems which when measured were not so long, usually 2 to 3 inches shorter, but all came into flower about the same time, in May, 1917.

April 25. Planted on walls around terrace garden, the following climbing roses and vines:

12 American Pillar rose
4 Hiawatha rose
4 Silver Moon
4 Dorothy Perkins, pink
4 White
2 Goldfinch
2 *Clematis paniculata*

- 6 Japanese Honeysuckle
- 2 *Wisteria chinensis*, blue
- 3 *Wisteria chinensis*, white
- 2 *Bignonia* sp., scarlet
- 12 *Ampelopsis Veitchii*

Planted April 27, 1917, in the perennial bed at southeast side of wall around garden:

- 50 *Boltonia asteroides*, white
- 100 *Boltonia latisquama*, pink
- 50 Aster, Beauty of Colwall, blue
- 25 Aster, Glory of Colwall, pink
- 25 Aster, Lil Fardel, mauve
- 25 Aster, Thos. Ware, lilac
- 25 Aster, Tom Sawyer, violet
- 25 Aster, White Queen, white
- 25 *Anemone* Prince Henry, crimson
- 25 *Helenium autumnale superbum*, yellow
- 25 *Helenium autumnale rubrum*, terra-cotta
- 35 *Tritoma Pfitzeri*, red
- 50 Phlox, assorted

All the above are fairly well established for the first season, and should make a good showing later on.

Planted out in beds on terrace garden during May and June, 1917, 550 early flowering Chrysanthemums in 11 separate varieties and colors of the following names:

- Petite Jean, white
- Cranfordia, bronzy yellow
- Evelyn, crimson
- Etoil d'or, yellow
- Firelight, carmine
- Harvest Home, deep yellow
- L'Aisne, violet purple
- Le Tage, terra cotta
- Cranford, pink
- Crimson Pride, crimson
- A. Barham, orange bronze

The above have all proven hardy and very suitable for bedding

out in masses, or along the borders, or for cutting. When cut and taken indoors they last from 8 to 10 days.

Annuals

Planted in June and up to July 15, 1917, in beds on terrace garden in separate varieties as follows, in groups of from 25 to 50 plants in each group:

Gaillardia picta Lorenziana

Larkspur, Loveliness

Larkspur, Stella

African Marigold, orange

African Marigold, lemon

Tagetes signata pumila

Ageratum, Blue star

Alyssum Benthami

Celosia, Pride of Castle Gould

Cosmos, Lady Lenox

Four O'Clocks

Petunia, Bar Harbor beauty

Scabiosa, fiery scarlet

Zinnia, yellow

Zinnia, crimson

Asters, branching shell pink

Helianthus, Stella

1000 Gladiolus, Mrs. F. King (500)

1000 Gladiolus, Yellow Giant (500)

There has been planted out on the trial grounds this fall for flowering in the spring and summer of 1918 from seed sown in August, 1917:

500 Sweet William Newport (pink)

300 *Anchusa*, Dropmore variety

150 *Aquilegia coerulea*

150 *Aquilegia*, Rose Queen

500 *Alyssum*, sexatile compactum

200 *Callopsiis grandiflora*

600 *Campanula Carpatica*, (blue and white)

500 *Campanula Medium*, (white)

- 200 *Campanula*, *Calycanthema* (blue, white and rose)
- 50 *Hibiscus palustris*
- 35 *Hibiscus*, Golden Bowl
- 150 Hollyhocks, double, scarlet, pink and yellow
- 500 *Myosotis*, Royal blue

There were translated into cold frames in 4 separate colors, white, yellow, blue and maroon-red, pansies, 350 to 400 in each color.

In November, 1917, 4500 single and double Hyacinths in separate colors were planted in groups and on the edges of the tulip beds. In the same month Mrs. Herbert Harde presented 12 Roses, Dr. Van Fleet and 3 Silver Moon.

Planted in beds around fountain in sunken garden, to flower in the spring of 1918 the following Tulips:

- 2000 Pink Beauty, pink
- 1500 Sir Thos. Lipton, scarlet
- 1500 Queen of Whites, white
- 500 White Hawk, white.

Also planted in groups on the terrace 1500 Darwin tulips in 5 varieties.

There were planted on first terrace in the two front beds 1000 double Narcissus, van Lion and on the two back beds, 1000 Tulips in 2 varieties, Rev. Ewbank 500, and Ellen Willmott, 500. There were also planted around the club and on the borders: 1000 mixed crocus, 1000 Snowdrops, 1500 Scillas (blue), 1000 Narcissus; all for naturalizing.

Notes and News

The Horticultural Society of New York is raising a fund, for the aid of French fruit growers, in replanting the orchards of France devastated by the war, which it is hoped will reach at least \$10,000, of which about \$3000 has been subscribed by garden clubs, other horticultural societies and individuals. This fund will be distributed in coöperation with the American Red Cross and the Société d'Horticulture de France. An appeal for contributions to this fund is made to all in sympathy with its object. See the advertising section for the details of this most timely effort.

From all that the war means to us and our Allies, it is difficult to keep our minds. Yet there are other things which, even if they seem relaxation from the chief obligation of all of us, must not be neglected. A note from a recent issue of the *New York Sun*, points to one way of forgetting, for the moment, what we can forget permanently only to our peril.

"Flower growing has greatly increased as a recreation in this country as an indirect result of the European war. This is indicated by the interest in the coming exhibition of the Horticultural Society of New York, which is to take place at the American Museum of Natural History, November 9 to 11 inclusive. The more serious aspect of life at present has had the tendency to divert the American people from lighter amusement and to find relief from the pressure of other duties in avocations which bring them close to nature. Some also foresee that flowers will be required in all military hospitals for the solace of the wounded.

The attendance at the autumn show of the Horticultural Society of New York at the American Museum of Natural History, on November 8-11, seems to bear out the statement in the paragraph from the *Sun*. The show was more largely attended than any previous one. The foyer hall of the museum was filled with large bushes of chrysanthemums and tall pillars of blooms, while large individual blossoms and others ranging down to the tiny pompoms filled the adjoining galleries. Three of the large bush chrysanthemums came from the conservatories of Mr. Adolph Lewisohn, who in previous years has broken all records in the size of the bushes he has sent to the exhibitions. Two large bushes came from the estate of Mr. Samuel Untermyer and three from the country place of Mr. James B. Duke near Somerville, N. J.

A large basket, filled with tiny flat chrysanthemums, the original Asiatic species, from which the immense cultivated specimens of the western hemisphere have come, was one of the attractive exhibits. Among the prize win-

ners were Adolph Lewisohn, James B. Duke, Capt. J. R. De Lamar, W. B. Thompson, Samuel Untermyer, G. D. Barron, Percy Chubb, A. N. Cooley, Miss M. T. Cockcroft, Mrs. H. Darlington, Mrs. S. Newstadt, Mrs. Payne Whitney, Adrian Iselin and Frederick Sturges.

At about the same time another autumn flower show was held at the Engineering Building in West 39th Street. It consisted mostly of Chrysanthemums, the chief exhibitors including Mrs. Payne Whitney and Mr. Percy Chubb. One of the interesting exhibits was a large round bush pink chrysanthemum exhibited by the Park Department of the Borough of Brooklyn, which was grown entirely in the open.

Information has been received by the Bureau of Plant Industry from Henry Nehrling regarding the effects of the cold wave in February, 1917, upon the Aroids cultivated by him in his garden at Gotha, near Orlando, Florida. *Anthurium cristallinum*, *A. regale*, and *A. Warocqueanum*, growing in exposed situations, were killed outright. *Pothos aurea*, *Nepthytis liberica*, *Monstera deliciosa*, several species of *Philodendron* and of *Anthurium*, and all the bushy *Spathiphyllums*, *Schismaglottis*, *Aglaonemas* and *Homalomenas* were injured but soon rallied; while *Spathiphyllum Wallisii* and *Aglaonema marantifolia* were not in the least hurt. An interesting variegated-leaved Aroid sent by Mr. Nehrling for identification proved to be *Syngonium podophyllum albolineatum*. He had received it under the name *Pothos argyrea*, a synonym of *Scindapsus pictus*. It has deeply-lobed palmate leaves with white stripes along the principal nerves. The typical form, with green leaves, does not appear to be cultivated. It is endemic in the tropical forests of Mexico, and was known to the ancient Aztecs under the name *Hoacaxochitl*.—W. E. SAFFORD.

The American Dahlia Society held a successful show at the Engineering Building on September 25. About 6000 varieties were shown. Among the prize winners were Judge J. C. Marion of Brooklyn, who brought from his summer home at Greens Farms, Conn., a collection of fifty wonderful blooms, all different, that brought a first prize. C. Louis Alling of West Haven, Conn., got a first with twenty-four varieties of short stemmed blossoms, and Frank R. Austin, a New Jersey grower, carried off several firsts. Mrs. C. F. Cortledge of Locust Valley showed some prize winning cactus dahlias, and Mrs. H. Darlington of Mamaroneck scored with several collections of long stemmed blooms.

Other prize winners were Mrs. A. B. Jennings of Fairfield, Conn. and John P. Rooney of New Bedford, Mass. Richard Vincent, Jr., president



DARWIN TULIP EUTERPE (PLANTED IN FEBRUARY)
AND IRIS GERMANICA
NEW YORK BOTANICAL GARDEN

of the Dahlia Society, brought a lovely collection from his greenhouses at Whitemarsh, Md.

The Red Cross dahlia, a hybrid cactus variety, of a wonderful yellow color shading to deep orange, which was new last year and on the market for the first time this season, has been practically sold out. This Dahlia brought a special prize to John F. Anderson, of Bernardsville, N. J., the grower.

Rudolph Appel, White Plains, N. Y., took the prize for big dahlias with a pink blossom, with yellow center, and Alfred E. Doty of New Haven won the prize for the smallest with a red pompom, the "Belle of Springfield." Mrs. H. Darlington took, among others, first prize for a beautiful pink peony dahlia, and another first for a basket of deep red cactus dahlias.

The necessity of increasing the food supply puts a double obligation on gardeners,—to save and to produce. One of the causes of worry last season was the lack of trained assistance. In fact, trained labor is the one pressing need on farms, and promises to be, says the New York State College of Agriculture. Since it seems difficult to increase the better supply, the College proposes to help make what labor there is more effective by giving free technical farm instruction to residents of New York. This instruction is designed to be of use to farmers themselves and to farm boys over eighteen years old.

As contributing to this, the College calls particular attention to the winter courses. These are of a practical nature and everything possible will be done to meet special needs. For example, the course in farm mechanics will give special attention to farm tractors, if, as seems likely, the students enrolled desire such instruction.

A feature of the course will be a series of weekly lectures under the general title of "Making Good on the Farm." In this series will be included talks by leaders of agriculture in the state and by farmers who will relate their own experience in farm enterprises. There will also be several lectures aimed to acquaint the student with the various state and local agricultural agencies whose activities may help the farmer in the present emergency. These talks will emphasize the fundamental lines of agricultural development.

An announcement of the courses may be obtained from the secretary of the College, Ithaca, N. Y. and many will avail themselves of the opportunity to make 1918 a banner year. The small garden as well as the farm will profit by the courses offered at Cornell, and many partial failures in back lot gardening near the larger cities might be successful in 1918 if more people could attend the lectures.

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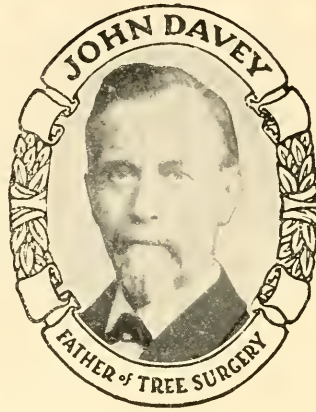
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Norman Taylor,
Brooklyn Botanic Garden,
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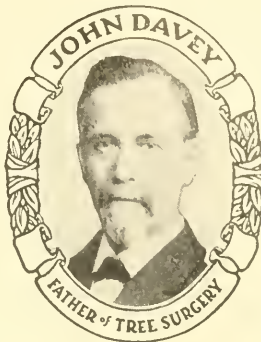
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